STATE OF WASHINGTON
ENERGY FACILITY SITE EVALUATION COUNCIL
PO Box 43172 • Olympia, Washington 98504-3172

December 19, 2022

Dear Reader:

The Energy Facility Site Evaluation Council (EFSEC) is pleased to present the Draft Environmental Impact Statement (Draft EIS) for the proposed Horse Heaven Wind Farm project (the Proposed Facility). The proponent, Horse Heaven Wind Farm, LLC (the Applicant), is indirectly owned by Scout Clean Energy, LLC, a renewable energy development company headquartered in Boulder, Colorado. The Applicant has applied for a Site Certification Agreement with EFSEC to construct and operate a renewable energy generation facility that would have a nameplate energy capacity of up to 1,150 megawatts. The Proposed Facility would consist of a combination of wind and solar facilities, as well as battery energy storage systems, and would be located approximately 4 miles south/southwest of the city of Kennewick and the larger Tri-Cities urban area along the Columbia River in unincorporated Benton County.

Under Washington State law, EFSEC is responsible for siting and licensing the construction and operation of major energy facilities in Washington State. EFSEC is conducting its review process as outlined in Chapter 80.50 Revised Code of Washington (RCW) and Title 463 of the Washington Administrative Code (WAC) for the Proposed Facility.

As the state lead agency, EFSEC has prepared the Draft EIS in accordance with the Washington State Environmental Policy Act (SEPA). The purpose of the Draft EIS is to evaluate the potential impacts of constructing and operating the Proposed Facility.

During EFSEC's SEPA scoping phase, areas of concern associated with the Proposed Facility were identified and subsequently addressed in this Draft EIS. The Draft EIS was prepared with information received from agencies, stakeholders, and members of the public.

The Draft EIS evaluates impacts from the construction, operation, and decommissioning stages of the Proposed Facility, including a cumulative environmental impact analysis. In addition to the Proposed Facility, the Draft EIS evaluates a no-action alternative.

The following resource areas were evaluated in the Draft EIS:

- Earth Resources
- Air Quality
- Water Resources
- Vegetation
- Wildlife and Habitat
- Energy and Natural Resources
- Land and Shoreline Use
- Historic and Cultural Resources
- Visual Aspects, Light and Glare
- Noise and Vibration
- Recreation
- Public Health and Safety
- Transportation
- Public Services and Utilities
- Socioeconomics

Key issues identified in the Draft EIS Executive Summary are associated with the following resources: vegetation, wildlife and habitat, cultural, visual, and recreation.

Significant unavoidable impacts are those impacts that remain significant, even after all mitigation measures committed to by the Applicant or recommended by EFSEC have been applied. The Draft EIS identified recommended mitigation measures to address potentially significant adverse environmental impacts from the Proposed Facility. In some instances, the identified mitigation would reduce but not completely eliminate the significant adverse impact. These impacts are identified as unavoidable and significant adverse environmental impacts.

A minimum thirty-day comment period is required by SEPA. However, in anticipation of requests for an extension, an additional fifteen days have been added to the comment period, the maximum allowed by SEPA, when the proponent does not agree to a longer comment period (WAC 197-11-455(7)).

The Draft EIS is available on EFSEC's project website at www.efsec.wa.gov/energy-facilities/horse-heaven-wind-project/horse-heaven-sepa. For further information regarding this proposal or to request a physical copy of the Draft EIS, you may contact the Energy Facility Site Evaluation Council at (360) 664-1345 or efsec@efsec.wa.gov. Printed copies will be provided for the cost of printing, and an electronic version will be provided for the cost of the USB drive or CD.

Sincerely,

Sonia E. Bumpus
EFSEC Director

State of Washington
Energy Facility Site Evaluation Council

FACT SHEET

Horse Heaven Wind Farm
Draft Environmental Impact Statement

Proposal Applicant:

Horse Heaven Wind Farm, LLC

Lead Agency and Responsible Official:

Washington State Energy Facility Site Evaluation Council (EFSEC);

Sonia Bumpus, EFSEC Director

Mailing address: PO Box 43172, Olympia,

WA 98504-3172

Physical address: 621 Woodland Square Loop SE, Lacey WA 98503

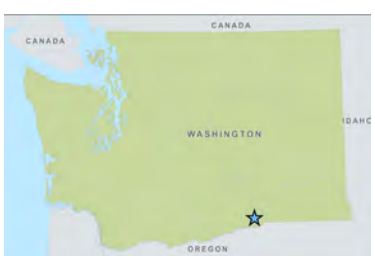
Abstract:

Horse Heaven Wind Farm, LLC (the Applicant) is proposing to construct and operate the Horse Heaven Wind Farm in unincorporated Benton County, Washington, within the Horse Heaven Hills area. The Project would consist of a renewable energy generation facility that would have a nameplate energy generating capacity of up to 1,150 megawatts (MW) for a combination of wind and solar facilities, as well as battery energy storage systems (BESSs).

Only the Proposed Action and the No Action Alternative were carried forward for detailed analysis in this Draft Environmental Impact Statement (EIS). However, impacts associated with two turbine height/number options and three solar array sites are discussed individually when information or differences are known.

Project Location:

The Project is located approximately 4 miles south/southwest of the city of Kennewick and the larger Tri-Cities urban area, along the Columbia River.



Required Permits, Approvals, and Licenses:

EFSEC's Site Certification Agreement (SCA) preempts otherwise applicable state and local regulatory permits pursuant to Revised Code of Washington (RCW) 80.50.110 and RCW 80.50.120. For informational purposes, Table 1.1-1 in the Draft EIS provides a list of these preempted state and local permitting requirements as well as federally delegated permits and requirements.

Authors and Principal contributors to the DEIS:

The Draft EIS was prepared at EFSEC's direction by its independent consultant, WSP Golder. Reports supporting the Draft EIS were completed by Golder Associates Ltd., and SWCA Environmental Consultants. Additional information on the authors and principal contributors is presented in Chapter 7 of the Draft EIS.

Date of Draft EIS Issuance: December 19, 2022

Date comments are due: February 01, 2023

Date, Time and Location for Public Hearings or Meetings: Information will be noticed to the public as it becomes available in accordance with Washington Administrative Code 197-11-535

Availability of the Draft EIS:

The document is available at no cost on the EFSEC website at: https://www.efsec.wa.gov/energy-facilities/horse-heaven-wind-project.

To obtain a printed copy or CD or USB drive of the Draft EIS (for the cost of production), please contact efsec@utc.wa.gov or (360) 664-1345.

The document is also available as a reference at local libraries:

Libraries where an Electronic Draft EIS is Available:

1. Mid-Columbia Libraries- Kennewick Branch
1620 S. Union Street
Kennewick, WA 99338

2. Mid-Columbian Libraries- Keewydin Park Branch
405 S. Dayton Street
Kennewick,
WA 99336

3. Mid-Columbia Libraries- Pasco Branch
1320 W. Hopkins Street
Pasco, WA 99301

4. Mid-Columbia Libraries- Prosser Branch
902 7th Street
Prosser, WA 99350

5. Mid-Columbian Libraries- West Pasco Branch
7525 Wrigley Drive
Pasco, WA 99301

6. Mid-Columbian Libraries- West Richland Branch
3803 W. Van Giesen Street, West Richland,
WA 99353

7. Richland Public Library
955 Northgate Drive
Richland, WA 99352

8. Washington State Library
Point Plaza East
6880 Capitol Boulevard
Tumwater, WA 98501

Date of Final Lead Agency Action:

After its evaluation is complete, EFSEC will submit a recommendation to the governor. If EFSEC recommends approval of the Facility, EFSEC will submit a draft SCA for the governor's signature. Within 60 days of receipt of EFSEC's recommendation, the governor may approve the Facility, reject the Facility, or direct EFSEC to reconsider the SCA. If an Application for Site Certification is denied, the proposal cannot be constructed and operated. The date of the governor's ultimate decision is not currently known.

Location of Background Information:

Documents regarding the SCA, scoping comments, public comments, land use, and adjudication can be found at https://www.efsec.wa.gov/energy-facilities/horse-heaven-wind-project.

The website also contains data requests, relevant correspondence from the Applicant, EFSEC, and other interested stakeholders on various aspects of the Application for Site Certification review and EIS process and is regularly updated with such information.

Contact for Additional Information:

Amy Moon, Energy Facility Site Specialist Lead

621 Woodland Square Loop SE

Lacey, WA 98503

PO Box 43172

Olympia, WA 98504-3172

360-664-1362

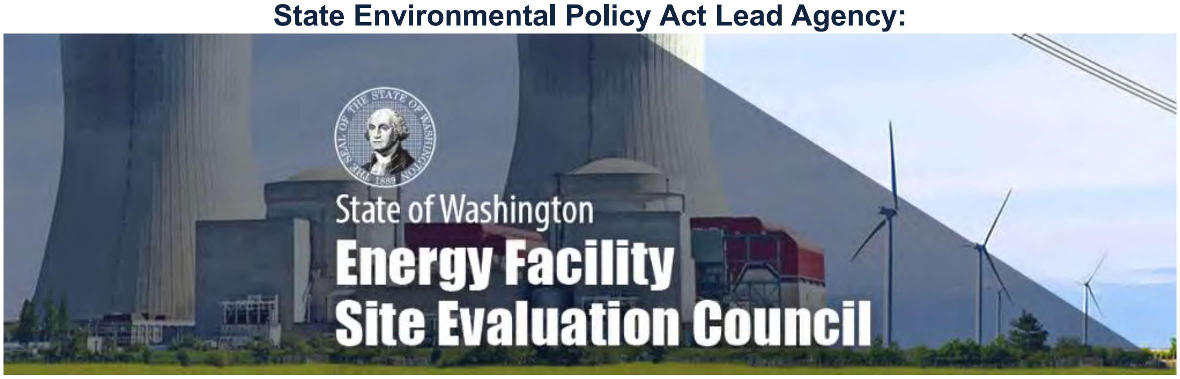
amy.moon@efsec.wa.gov

Horse Heaven Wind Farm

Draft Environmental Impact Statement

December 2022

State Environmental Policy Act Lead Agency:



This Page Intentionally Left Blank

Table of Contents

TABLES

FIGURES

ATTACHMENTS

APPENDICES

This Page Intentionally Left Blank

ACRONYMS AND ABBREVIATIONS

°F	degrees Fahrenheit
ADT	average daily traffic
ACEC	Area of Critical Environmental Concern
APP	Avoidance and Protection Plan
Applicant	Horse Heaven Wind Farm, LLC
ASC	Application for Site Certification
ASCE	American Society of Civil Engineers
ASOS	Automated Surface Observing Systems
ASR	aquifer storage and recovery
B.P.	before present
BBCS	Bird and Bat Conservation Strategy
BCAA	Benton Clean Air Agency
BCC	Benton County Code
BCEM	Benton County Emergency Management
BDI	Basin Disposal, Inc.
Benton PUD	Benton County Public Utility District
Benton REA	Benton County Rural Electric Association
BESS	battery energy storage system
bgs	below ground surface
BFCOG	Benton-Franklin Council of Governments
BFEDD	Benton-Franklin Economic Development District
BLM	Bureau of Land Management
BMP	best management practice
BPA	Bonneville Power Administration
CAA	Clean Air Act
CadnaA	Computer Aided Noise Abatement
CARA	Critical Aquifer Recharge Area
CCS	crypto-crystalline silicate
CEQ	Council on Environmental Quality
CESA	Clean Energy States Alliance
CFR	Code of Federal Regulations
CH_4	methane
CIE	Commission Internationale de l'Eclairage
cm	centimeters
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
Columbia Ridge	Columbia Ridge Landfill and Green Energy Plant
CRP	U.S. Department of Agriculture's Conservation Reserve Program
CSZ	Cascadia Subduction Zone
CTUIR	Confederated Tribes of the Umatilla Indian Reservation
CWA	Clean Water Act
DAHP	Department of Archaeology and Historic Preservation
dB	decibels
dBA	A-weighted decibels
DDT	dichlorodiphenyltrichloroethane
DEQ	Oregon Department of Environmental Quality
DNR	Washington State Department of Natural Resources
DSRP	Detailed Site Restoration Plan
Ecology	Washington State Department of Ecology
EDNA	Environmental Designation for Noise Abatement
EF	emissions factor
EFSEC	Washington Energy Facility Site Evaluation Council
EIS	Environmental Impact Statement
EJ	environmental justice
ELZ	Environmental Lighting Zone
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
ESCP	Erosion and Sediment Control Plan
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulation

FGTS	Freight and Goods Transportation System
FHWA	Federal Highway Administration
FMSIB	Freight Mobility Strategic Investment Board
FR	Federal Register
FRA	Federal Railroad Administration
FSAC	Freight Station Accounting Code
FTA	Federal Transit Administration
FTE	full-time equivalent
GAP	Gap Analysis Project
GE	General Electric
GE	General Electric
GHG	greenhouse gas
GMA	Washington State Growth Management Act
GWP	global warming potential
HAP	hazardous air pollutant
HCA	habitat concentration area
HRA	Historical Research Associates, Inc.
HV	high voltage
Hz	hertz
I-82	Interstate 82
I-84	Interstate 84
IAF-NGT	Ice Age Floods National Geologic Trail
IBC	International Building Code
IDP	Inadvertent Discovery Plan
JARPA	Joint Aquatic Resource Permit Application
km	kilometers
km^2	square kilometers
KOP	key observation point
kV	kilovolts
LED	light-emitting diode
LEED	Leadership in Energy and Environmental Design
LNTE	low noise trailing edge
LOS	level of service
mag/arcsec^2	magnitudes per square arcsecond
met tower	meteorological tower
MOVES	Motor Vehicle Emission Simulator
MPD	Multiple Property Documentation
mph	miles per hour
MSA	Metropolitan Statistical Area
MSW	municipal solid waste
MW	megawatts
M_W	moment magnitude; *also* M
Mwac	megawatts of alternative current
MW-hr	megawatt hours
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NCT	Notice Criteria Tool
Nez Perce	Nez Perce Tribe
NLCD	National Land Cover Database
NO_2	nitrogen dioxide
NO_X	oxides of nitrogen
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NRO	noise reduced operation
NSR	noise sensitive receptor
O&M	operation and maintenance
O_3	ozone
ODFW	Oregon Department of Fish and Wildlife
OFM	Washington State Office of Financial Management
OHV	off-highway vehicle
OHWL	Ordinary High Water Line
OPRD	Oregon Parks and Recreation Department
Pb	lead
PCFM	post-construction fatality monitoring
PGA	peak ground acceleration
PHS	Priority Habitats and Species
Plateau	Columbia Plateau
PM_{10}	particulate matter less than 10 microns

$PM_{2.5}$	particulate matter less than 2.5 microns in diameter
Project	Horse Heaven Wind Farm; *also* Proposed Action
Proposed Action	Horse Heaven Wind Farm; *also* Project
PUD	Public Utility District
PV	photovoltaic
RCCH	RCCH Health Care Partners/Trios
RCW	Revised Code of Washington
RFD	reasonably foreseeable development
RV	recreational vehicle
Sandia	Sandia National Laboratories
SCA	Site Certification Agreement
SCADA	supervisory control and data acquisition
SECOMM	Southeast Communications Center
SEPA	Washington State Environmental Policy Act
SGHAT	Solar Glare Hazard Analyis Tool
SIP	State Implementation Plan
SMA	Shoreline Management Act
SMP	Shoreline Master Program
SO_2	sulfur dioxide
SPCC	Spill Prevention, Control, and Countermeasures
SPL	sound pressure level
SWPPP	Stormwater Pollution Prevention Plan
TAC	Technical Advisory Committee
TCP	traditional cultural property
TIP	transportation improvement program
TLG	TLG Transport
Tribes	Yakama Nation, the Confederated Tribes of the Umatilla Indian Reservation, the Nez Perce Tribe, and the Wanapum Tribe
TUS	traditional use study
TV	television
UE	utilities element
UFC	Unified Facilities Criteria
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UTC	Washington Utilities and Transportation Commission
VAA	Vegetation Area of Analysis
VMT	vehicle miles travelled
VOC	volatile organic compound
VRM	Visual Resource Management
WAC	Washington Administrative Code
Waste Management	Waste Management of Kennewick
WDFW	Washington Department of Fish and Wildlife
WHCWG	Wildlife Habitat Connectivity Working Group
WHR	Washington Heritage Register
WISAARD	Washington Information System for Architectural and Archaeological Records Data
WNHP	Washington Natural Heritage Program
WQI	Freshwater Quality Index
WRIA	Water Resource Inventory Area
WSDOT	Washington State Department of Transportation
Yakama Nation	Confederated Tribes and Bands of the Yakama Nation
YFTB	Yakima Fold and Thrust Belt
ZOI	zone of influence

This Page Intentionally Left Blank

EXECUTIVE SUMMARY

Horse Heaven Wind Farm, LLC (Applicant) is proposing to construct and operate the Horse Heaven Wind Farm (Project, or Proposed Action) in unincorporated Benton County, Washington, within the Horse Heaven Hills area. The Washington State Energy Facility Site Evaluation Council (EFSEC) is the state agency responsible for evaluating and making recommendations to the governor on the approval or denial of certain major energy facilities in Washington. This includes voluntary applicants, as in the case of the proposed Project.

ES-1 Purpose of this Environmental Impact Statement

During the site certification process, EFSEC reviewed the Application for Site Certification[1] (ASC) and is serving as the "lead agency" responsible for complying with the Washington State Environmental Policy Act (SEPA) procedural requirements (Washington Administrative Code [WAC] 463-47). EFSEC prepared this Draft Environmental Impact Statement (EIS) under SEPA with the assistance of an independent consultant and cooperating state agency support, reviewing all Applicant-prepared information and analyses in the ASC and conducting additional analyses as needed during preparation of this Draft EIS.

ES-2 Proposed Action and Alternatives

ES-2.1 Proposed Action: Horse Heaven Wind Farm Project

The Project would consist of a renewable energy generation facility that would have a nameplate generating capacity[2] of up to 1,150 megawatts for a combination of wind and solar facilities, battery energy storage systems (BESS), and other Project components, including underground and overhead electrical collection lines, underground communication lines, new Project substations, access roads, operations and maintenance facilities, and meteorological towers.

At its closest point, the Project would be located approximately 4 miles south/southwest of the City of Kennewick and the larger Tri-Cities urban area, along the Columbia River. **Figure ES-1** shows the Project Lease Boundary and Project vicinity. The Project's Lease Boundary (approximately 72,428 acres) incorporates all of the parcels for which the Applicant has executed a lease to construct the turbines, solar arrays, and associated facilities. The Project's Wind Energy Micrositing Corridor encompasses 11,850 acres within the Lease Boundary and consists of the areas where the turbines and supporting facilities would be sited during the final design. The Applicant seeks authorization for up to 244 turbine locations and a maximum of three solar arrays, with all possible turbine locations and solar arrays cumulatively reviewed to analyze potential resource impacts.

As shown in **Table ES-1**, the maximum number of turbines and maximum turbine height carried forward for analysis as components of the Proposed Action are reflected in Turbine Option 1 and Turbine Option 2**.** The number of turbines would not exceed 244, and the maximum turbine height (at blade tip) would not exceed 671 feet. For the purpose of analyzing the maximum footprint and impact, this Draft EIS assumes that the road disturbance associated with Turbine Option 1 and Turbine Option 2 would be identical.

[1] An Application for Site Certification (ASC) is a formal submittal prepared by an applicant that provides EFSEC with information regarding the Applicant, the proposed project design and features, the natural environment, and the built environment in sufficient detail to enable EFSEC to go forward with its application review.

[2] Nameplate generating capacity is the amount of electricity a generator can produce when running at its maximum designed output.

Table ES-1: Proposed Action - Wind Turbines[a]

Turbine Options	Option 1	Option 2
Layout Description	244 turbines up to a maximum blade tip height of 499 feet	150 turbines up to a maximum blade tip height of 671 feet
Temporary Disturbance	1,070 acres	
Permanent Disturbance	30 acres	
Lease Boundary	72,428 acres	

Source: ASC Table 2.1-1; Table 2.3-1 (Horse Heaven Wind Farm, LLC 2021)
Note: [a] As proposed in the ASC

Table ES-2 presents the temporary and permanent disturbance acreage for the solar siting and supporting infrastructure for the wind and solar facilities. The Project's Solar Siting Areas, which are three locations under consideration for the proposed solar arrays, encompass 10,755 acres within the Lease Boundary. The wind energy components would be combined with the solar arrays, BESSs, and other infrastructure to provide solar and wind energy.

Table ES-2: Proposed Action - Solar Siting and Supporting Infrastructure for Wind and Solar Facilities[a]

<table>
<tr><th>Project Infrastructure</th><th>Temporary Disturbance (acres)</th><th>Permanent Disturbance (acres)</th></tr>
<tr><td colspan="3">Solar Arrays in Fields</td></tr>
<tr><td>East Solar Field</td><td>37</td><td>1,994</td></tr>
<tr><td>County Well Solar Field</td><td>18</td><td>2,641</td></tr>
<tr><td>Sellards Solar Field</td><td>22</td><td>1,935</td></tr>
<tr><td>Total Disturbance Acreage of Solar Arrays in Fields</td><td>77</td><td>6,570</td></tr>
<tr><td colspan="3">BESSs[3]</td></tr>
<tr><td>BESS adjacent to the Bofer Canyon - HH-East Substation</td><td rowspan="3">1</td><td rowspan="3">18</td></tr>
<tr><td>BESS adjacent to the Primary HH-West Step-Up Substation</td></tr>
<tr><td>BESS adjacent to the Alternate HH-West Step-Up Substation</td></tr>
<tr><td colspan="3">Substations</td></tr>
<tr><td>HH-East Substation</td><td rowspan="5">3</td><td rowspan="5">38</td></tr>
<tr><td>Primary HH-West Intermediate Substation</td></tr>
<tr><td>Alternate HH-West Intermediate Substation</td></tr>
<tr><td>Primary HH-West Step-Up Substation[b]</td></tr>
<tr><td>Alternate HH-West Step-Up Substation[b]</td></tr>
</table>

[3] The Applicant indicated in the ASC that there is the potential for fewer than three BESSs to be constructed but has requested analysis for all the components and distinct parts as presented in Table 2.1-1 of the ASC.

Table ES-2: Proposed Action - Solar Siting and Supporting Infrastructure for Wind and Solar Facilities[a]

Project Infrastructure	Temporary Disturbance (acres)	Permanent Disturbance (acres)
Supporting Infrastructure		
Roads,[c] Crane Paths, Laydown Yards, O&M Facilities, Met Towers	870.9	218.5
Collector Lines		
Overhead	0.5	0.01
Underground	787	0.06
Transmission Lines		
230 kV	235	0.02
500 kV	12	<0.01
Total Disturbance Acreage of Supporting Infrastructure	**1,905.4**	**218.6**

Source: Horse Heaven Wind Farm, LLC 2021

Note:

[a] As proposed in the ASC, Table 2.1-1

[b] May alternatively be used as the HH-West Alternate Solar Substation (ASC Table 2.3-2) to support solar operations, depending on the location where the Bonneville Power Administration elects to construct the Webber Canyon Substation.

[c] Includes new access roads and road modification (turning radius widening). This Draft EIS assumes that road disturbance would be identical under both Option 1 and Option 2.

ASC = Application for Site Certification; BESS = battery energy solar station; HH = Horse Heaven; kV = kilovolt; met tower = meteorological tower; O&M = operations and maintenance

This Page Intentionally Left Blank

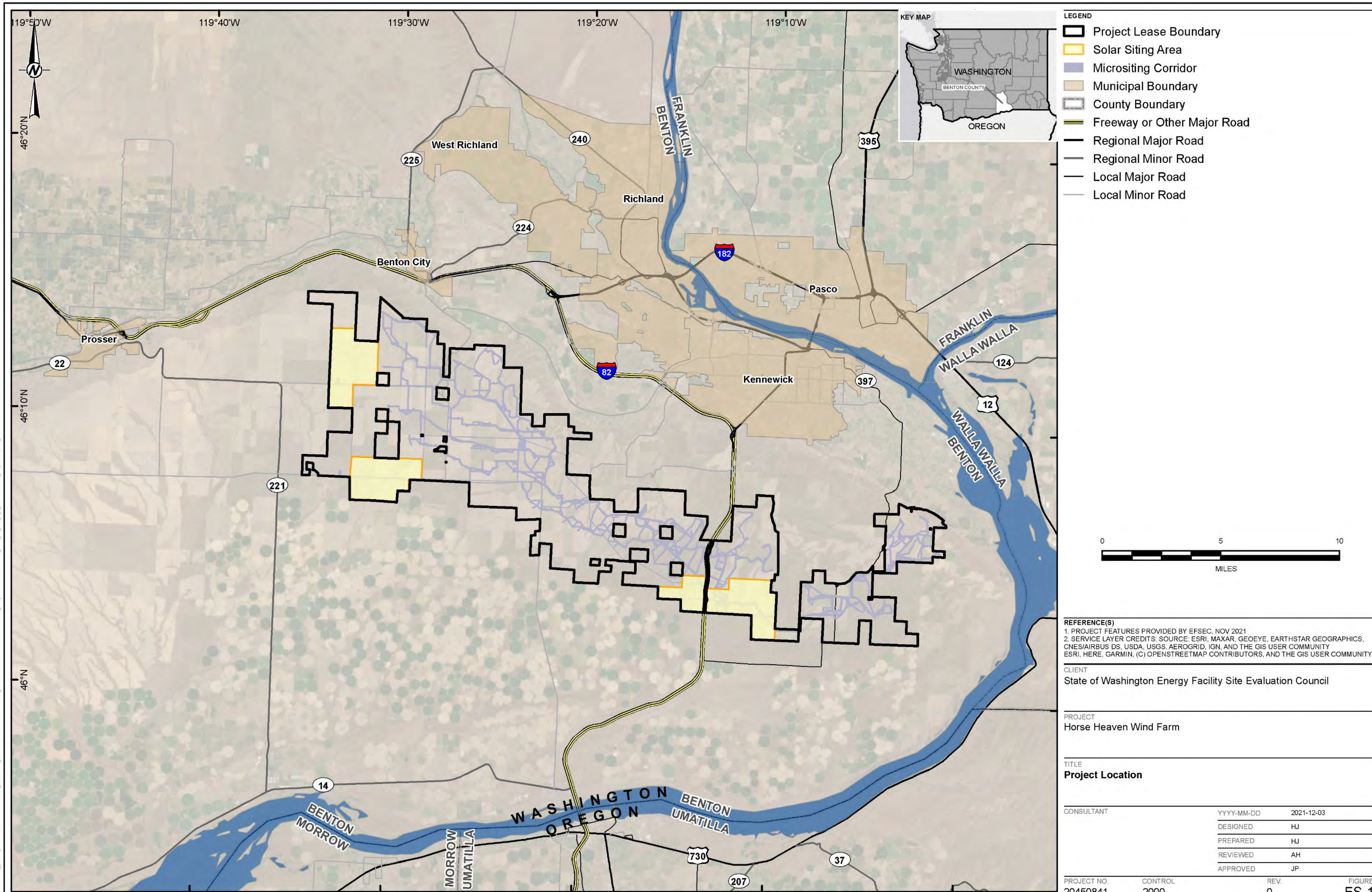


Figure ES-1: Project Lease Boundary and Project Vicinity

ES-2.2 Alternatives to the Proposed Action

Several alternatives were considered for analysis but were eliminated from detailed evaluation in the Draft EIS because they would not generate the designed nameplate generating capacity required by the Applicant. The No Action Alternative was carried forward for analysis in the Draft EIS. Under the No Action Alternative, the Project would not be constructed or operated, power would not be supplied by the Project, and the potential environmental impacts associated with the Project would not occur. As part of the No Action Alternative, existing agricultural use in the Lease Boundary would continue without interruption.

ES-3 Environmental Impact Analysis

ES-3.1 Approach to Impact Assessment

This Draft EIS identifies impacts from the Proposed Action and the potential environmental impacts associated with the No Action Alternative. "Impacts" are the effects or consequences of actions (WAC 197-11-752) upon the environmental resources listed in ES-3.2. For example, an impact from grading during construction could result in the production of fugitive dust. The dust would then have the potential to affect various nearby resources such as surface waters, where it could contribute to nutrient loading, or, if it landed on neighboring vegetation, could smother and kill the plants. In accordance with SEPA, this Draft EIS weighs the likelihood of occurrence with the severity of an impact (WAC 197-11-794) and considers several factors when analyzing potential impacts.

This Draft EIS presents an analysis of impacts for each of the three Project stages (i.e., pre-construction and construction, operation, and decommissioning) on the elements of the environment identified in ES-3.2. The impacts associated with the Proposed Action and under the No Action Alternative are described quantitatively if sufficient data or information were available to do so.

When detailed information was not available and that information was not essential to determining the level of adverse environmental impacts, impacts are described qualitatively. In addition to existing laws and regulations, conservation measures and best management practices proposed by the Applicant in the ASC to avoid or reduce potential impacts during Project stages are taken into consideration in the characterization of potential impacts. Three types of environmental impacts are described in the Draft EIS:

Direct impacts: These are the effects of an action (i.e. construction, operation and maintenance, or decommissioning) on a resource that occur at the same time and place as the action. An example of a direct impact would be increased noise levels experienced by residents living near a construction site.

Indirect impacts: These are impacts that are similar to direct impacts in that they are caused by an action; however, they occur later in time or further from the activity causing the impact. An example of an indirect impact would be a decline in numbers of a wildlife species due to fragmentation of that species' habitat by installation of fencing.

Cumulative impacts: These are the combined results of incremental direct and indirect impacts on resources from a project or plan, past and present actions, and other reasonably foreseeable developments. An example of a cumulative impact would be if increased runoff and contaminants from construction were added to the volumes and levels of contamination from similar development projects surrounding the same wetland.

The Draft EIS presents the discussion of impacts that could result from the comprehensive Project and the various individual components (e.g., Turbine Option 1, Turbine Option 2, solar arrays). An analysis of the comprehensive Project evaluates the full extent of the Proposed Action's impacts. The additional information obtained from the various individual components can identify which, if any, components would contribute to a medium or high impact and will assist in further examination of possible options to mitigate the impact of those components and, ultimately, reduce the impact of the comprehensive Project.

ES-3.2 Environmental Resources Analyzed

The following resources of the built and natural environment are characterized for existing conditions and analyzed for potential impacts:

Earth Resources (including seismic hazards)	Visual Aspects, Light and Glare
Air Quality	Noise and Vibration
Water Resources	Recreation
Vegetation	Public Health and Safety
Wildlife and Habitat	Transportation
Energy and Natural Resources	Public Services and Utilities
Land and Shoreline Use	Socioeconomics
Historic and Cultural Resources	

ES-3.2.1 Special Studies

During the preparation of the Draft EIS, EFSEC asked its independent contractor to prepare special studies related to collision risk of birds and bats with wind turbines and the visual impacts of turbines for the two turbine options (Turbine Option 1 and Turbine Option 2) described in ES-2.1. The following special studies are included as appendices to this Draft EIS:

The Wind Turbine Wildlife Collision Risk Assessment: Horse Heaven Wind Farm: This special study, presented as Appendix 4.6-1 of the Draft EIS, compares the potential bird and bat collision risk associated with each turbine option. The information and conclusions presented in the study are based on existing information collected during the Proposed Action's baseline studies and a review of published scientific literature pertaining to bird and bat interactions with wind turbines (GAL 2022).

Horse Heaven Wind Farm Project Final Visual Impact Assessment Report: This special study, presented as Appendix 4.10-1 of the Draft EIS, focuses on potential visual impacts resulting from modification of the landscape and the response of viewers to those features. Additionally, the study analyzes whether the Proposed Action would be consistent with and comply with state and local visual resource guidance. The information contained in the special study report was provided by the Applicant and supplemented with publicly available data where necessary. Information and conclusions presented in the special study focused on the introduction of the Proposed Action into the setting and characterization of long-term modifications to the existing landscape's form, line, color, and texture (SWCA 2022).

ES-3.3 Impacts from the Proposed Action for Which EFSEC Identified Mitigation and/or Significance

Mitigation measures can be implemented to reduce impacts associated with the construction, operation and maintenance, and decommissioning of the Project. **Attachment ES-3-1** presents a comprehensive list of EFSEC identified Mitigation Measures. Such measures may be imposed by EFSEC pursuant to their authority under

Revised Code of Washington (RCW) 80.50 or through the use of their SEPA “substantive authority,” which provides the ability to condition or deny a proposal based on identified environmental impacts (WAC 197-11-660).

Mitigation measures put forth by EFSEC in this Draft EIS are identified by an abbreviation of the affected resource and sequential numbering system. If the same mitigation measure is recommended to address impacts to another resource later in the Draft EIS, the mitigation measure retains its initial unique identifier. For example, mitigation measure ENR-5 is first recommended in the analysis of Energy and Natural Resources. ENR-5 is subsequently presented as a recommended mitigation measure to address impacts to Public Services and Utilities.

Taking mitigation into account, each impact identified in this Draft EIS is categorized as significant or nonsignificant. **Tables ES-3 and ES-4** described below and attached to this Executive Summary as **Attachment ES-3-2** provide a summary of the impacts identified in this Draft EIS:

Tables ES-3 (a, b, & c) summarize the impacts identified for each element of the environment (see Section ES-3.2 above for the complete list). The impacts are presented in respect to the comprehensive Project, mitigation identified by EFSEC, and the determination of significant unavoidable impacts that may occur during the construction, operation, and decommissioning of the Project. Impacts identified with a medium to high magnitude of impact are highlighted in light blue.

Tables ES-4 (a, b, & c) summarize the impacts identified for each element of the environment (see Section ES-3.2 above for the complete list). The impacts are presented in reference to Project components (Turbine Option 1, Turbine Option 2, solar arrays, BESSs, and substations), mitigation identified by EFSEC, and the determination of significant unavoidable impacts that may occur during the construction, operation, and decommissioning of the Project. Impacts identified with no mitigation and with a negligible to low magnitude of impact were not included in these tables. Impacts identified with a medium to high magnitude of impact are highlighted in light blue. All impacts, including negligible and low magnitude impacts are included in the tables at the end of each resource Section 4.

EFSEC is the State of Washington agency that is responsible for making the decision about whether a potential impact is significant. “Significant” in SEPA means a reasonable likelihood of more than a moderate adverse impact on environmental quality. An impact may also be significant if its chance of occurrence is not great, but the resulting environmental impact would be severe if it occurred. This Draft EIS weighs the likelihood of occurrence with the severity of an impact (WAC 197-11-794) when determining the significance of identified potential impacts (WAC 197-11-330 and WAC 197-11-794). “Significant unavoidable impacts” are impacts that remain significant, even after all measures committed to by the Applicant and mitigation recommended by EFSEC have been applied.

ES-3.4 Cumulative Impacts

When impacts are assessed for an individual proposed action, they may be determined less than significant, but when considered collectively (cumulatively) with the impacts of other actions, especially over a period of time, they can be significant (40 Code of Federal Regulations 1508.7). SEPA requires that agencies address cumulative impacts.

Cumulative impacts are the combined result of incremental direct and indirect impacts on resources of concern from a project or plan, past and present actions, and other reasonably foreseeable developments. Reasonably foreseeable developments generally include actions that are currently underway, formally proposed or planned, or highly likely to occur based on available information. The Draft EIS identifies past, present, and reasonably foreseeable future developments that could interact with resources impacted by the Proposed Action and analyzes the potential for cumulative impacts.

Information about direct and indirect impacts of past and present actions is useful in identifying and predicting the level of impact a proposed action might have on the natural or built environment. However, the impacts of past actions may have no cumulative relationship to the impacts of a proposed action. To fully evaluate cumulative impacts, it is necessary to assess the type and extent of a proposed action's impacts and how the project and its alternatives would add to, modify, or mitigate impacts from past actions. In accordance with Council on Environmental Quality (CEQ) guidance, this cumulative impact analysis focuses on the current aggregate impacts of past actions without delving into the historical details of individual past projects (CEQ 2005).

Table ES-5 presents the resources that the Proposed Action would cumulatively impact in a meaningful way,. It describes the direct or indirect impact that the Proposed Action would have for each resource, and whether that impact would be significant. It then identifies whether cumulative impacts to that resource have been identified from past and present actions and RFDs. Finally, it indicates whether the impact from the Proposed Action would make a meaningful contribution to a cumulative impact when combined with past and present actions and RFDs..

Table ES-5: Summary of Significance Determinations and Cumulative Impact

Section	Topic	Description of Impact from the Proposed Action	Significant Direct or Indirect Impact from the Proposed Action	Cumulative Impacts from Past and Present Actions and RFDs	Proposed Action Meaningfully Contributes to a Cumulative Impact
Vegetation	Priority Habitat	Loss and degradation of Priority Habitat	No	**Yes**	**Yes**
Vegetation	Special Status Plant Species	Loss and isolation of special status plant species	No	**Yes**	**Yes**
Wildlife and Habitat	Habitat Loss	Habitat loss and degradation	No	**Yes**	**Yes**
Wildlife and Habitat	Barriers to Movement and Fragmentation	Fencing as a barrier to movement and fragmentation of habitat due to Project footprint	No	**Yes**	**Yes**
Wildlife and Habitat	Wildlife Mortality	Mortalities from wildlife-vehicle collisions or turbine strikes	No	**Yes**	**Yes**
Wildlife and Habitat	Special Status Species	Loss of special status species from mortalities or loss or degradation of habitat	No	**Yes**	**Yes**
Historic and Cultural Resources	Archaeological Resources	Partial or complete loss of archaeological resources	**Yes**[(a)]	**Yes**	**Yes**
Historic and Cultural Resources	Traditional Cultural Properties	Partial or complete loss of traditional cultural properties and resources	**Yes**[(a)]	**Yes**	**Yes**
Visual Aspects, Light and Glare	Visual Aspects	Turbines would dominate the existing landscape and viewshed.	**Yes**	**Yes**	**Yes**
Visual Aspects, Light and Glare	Light and Glare	Security lighting and solar panels would introduce sources of light and glare	No	**Yes**	**Yes**
Noise and Vibration	Noise	Noise from construction and Project components during operation.	No	**Yes**	**Yes**
Recreation	Recreation - Use	Reduction in access to available recreation lands	No	**Yes**	**Yes**
Recreation	Recreation – Public Health and Safety	Health and safety of paragliders and hang gliders	**Yes**	**Yes**	**Yes**
Transportation	Traffic Volume	Increased traffic volume from construction and decommissioning	No	**Yes**	**Yes**
Transportation	Level of Service	Decreased level of service for motorists, particularly at intersections close to Project	No	**Yes**	**Yes**
Transportation	Roadway Safety	Safety of motorists due to the presence and movement of heavy vehicles	No	**Yes**	**Yes**

ES-4 Key Issues and Issues to be Resolved

ES-4.1 Additional Analysis

ES 4.1.2 Air Quality for Construction and Decommissioning

The Applicant provided air emission information based on the assumption that the Project would be constructed in two phases (see Section 2.15 of the ASC). The Project does not currently include single phase/concurrent construction of all three solar arrays, one of the turbine options, and three BESSs, although the ASC did include all these items as part of a maximum footprint to be analyzed. At this time, the air quality environmental impact analysis is based on two phases of construction, which would reduce the amount of construction equipment operating at one time as compared to constructing all components in one phase.

For this Draft EIS, the Applicant's example of a two-phased approach[4] presented in the ASC was used as a basis of analysis for the Proposed Action's impact on air quality during construction and decommissioning. If the Applicant determines that their approach to construction would require more flexibility, such as constructing the Project in one phase, then the Final EIS would need to analyze the air emissions for the maximum air quality impact scenario. Following issuance of the Final EIS, any changes to construction phasing that involves more construction occurring at the same time would require additional environmental analysis, which could result in a SEPA Addendum or a Supplemental EIS, depending on the significance of any new adverse environmental impacts (WAC 197-11-600 (4)(c) and (d)).

ES-4.2 Significant Impacts Worst Case Analysis

ES 4.2.1 Cultural Resources

SEPA directs EFSEC to analyze adverse environmental impacts on cultural resources caused by the proposed Project. A third-party consultant has completed cultural resource investigations and inventory reports of both private land and Washington Department of Natural Resource-administered land within the Project Lease boundary. The Project may impact Traditional Cultural Properties (TCPs) that include but are not limited to spiritual sites, traditional use sites, and the specific geographic availability of foods and medicines. The Yakama Nation has stated that several TCPs may be impacted by the proposed Project. Furthermore, the Yakama Nation has indicated to the third-party consultant that a documented archaeological resource located within the Project Lease Boundary is directly associated with a TCP. Tribal coordination is currently ongoing and will continue through Project completion. Any information on TCPs in the Project area and vicinity would remain confidential and would not be available to the public. In the meantime, EFSEC is required to include a worst-case analysis of adverse environmental impacts and likelihood of occurrence (WAC 197-11-080). A number of impacts on cultural resources, including TCPs, are identified as significant; additional information and mitigation identified prior to the Final EIS may change the impact ratings.

ES-4.3 Impacts and Mitigation Affecting Multiple Resources

ES 4.3.1 Wildlife, Cultural Resources, Visual Resources

The Draft EIS identifies impacts on multiple resources that may result from the Project's turbine layout. Individual turbines may cause impacts on cultural, visual, and/or wildlife resources. It will be useful for these turbines to be identified and for decisionmakers to be aware of the level of mitigation that removal of individual turbine locations might provide. Additionally, prior to the Final EIS, the Applicant may voluntarily offer to remove certain turbine

[4] The Applicant's two phased approach to construction was used as the basis of analysis for the Proposed Action's impact on air quality, transportation, and socioeconomics.

locations as a result of the analysis provided in the Draft EIS. In either case, EFSEC is working to provide more information in the Final EIS about individual turbine locations that impact multiple resources and any recommendations for removing locations that would mitigate impacts.

ES 4.3.2 Vegetation, Wildlife and Habitat

The Draft EIS identifies loss of Priority Habitats, loss of wildlife habitat, degradation of habitat (e.g., indirect habitat loss), wildlife mortality, and creation of barriers to movement and habitat fragmentation as potential impacts to vegetation, wildlife, and habitat. The extent of these impacts may vary depending on the proximity of individual turbines to sensitive habitats (e.g. nests, Priority Habitats, movement corridors), height of the turbines, and siting of ancillary components.

EFSEC has identified mitigation measures, in addition to Applicant-identified commitments, to reduce impacts on vegetation, wildlife, and habitat. For vegetation, EFSEC has recommended mitigation measures to avoid and reduce impacts on trees and special status plants by requiring that these features be avoided, and additional pre-disturbance surveys be conducted. Further, EFSEC has recommended that an as-built report and offset calculation be provided once construction is complete.

For wildlife and habitat, these mitigation measures include the establishment of a Technical Advisory Committee to review and provide input to pre-construction surveys, post-operation monitoring, and implementation of mitigation measures. Additionally, EFSEC has identified measures to avoid sensitive features and habitats, develop wildlife and habitat specific management plans (e.g., Indirect Habitat Loss Management Plan), and conduct additional pre-construction and post-operation surveys to inform the final design and monitor changes in species abundance and richness through operation. Due to the interconnected relationship between vegetation and wildlife and habitat, recommended mitigation measures for each of these resources has the potential to address impacts from the Proposed Action to the other.

ES 4.3.3 Energy and Natural Resources, Public Services and Utilities

There are mitigation measures for retrieving and recycling as much of the natural resources used in construction and operation of the Project as possible. For example, throughout the Project's lifecycle, the Applicant would recycle all components of the Project that have the potential to be used as raw materials in commercial or industrial applications. Similarly, to reduce the amount of water necessary to operate the Project, the Applicant would capture and recycle wash water during the operations stage. These mitigation measures would reduce the amount of waste that would be sent to sewage and solid waste treatment facilities, thereby serving as useful mitigation for both resource areas.

ES-4.4 Impacts That May Not Have Been Identified As Significant by the End of the Analysis but Are Issues of Concern That Warrant Discussion

ES 4.4.1 Curtailment and Exclusion of Turbines to Address Impacts on Ferruginous Hawk

The Draft EIS has identified potential impacts on ferruginous hawk habitat and populations through loss of habitat and potential mortality from collision with wind turbines. As these impacts could result in a high-magnitude impact on ferruginous hawks, EFSEC has proposed additional mitigation measures specific to avoiding and reducing Project-related impacts on ferruginous hawks, including exclusion of turbines within core ferruginous hawk habitat and curtailing turbine operation while ferruginous hawks are present. Specifically, mitigation measures for ferruginous hawks would require avoiding siting Project components within 2 miles of ferruginous hawk nests documented in PHS data and reported by the Applicant in the ASC (Horse Heaven Wind Farm, LLC 2021) to preserve foraging habitat. Where siting features away from ferruginous hawk habitat is not feasible, the mitigation measure would require using options such as turbine curtailment to reduce potential strikes with ferruginous hawks in core habitat while nests are active (i.e., during the breeding season). The extent to which ferruginous hawk mitigation may be implemented will be informed by the final Project layout and field data on ferruginous hawk presence and habitat use of the Lease Boundary collected through pre-construction monitoring programs.

ES 4.4.2 Loss of Priority Habitat

The Draft EIS has identified potential impacts on Priority Habitat. These impacts are concentrated within the areas of the Micrositing Corridor and East Solar Field. Impacts to Priority Habitat include:

Permanent disturbance[5] of 72.5 acres of Eastside (interior) grassland and temporary disturbance[6] of 16.2 acres. Eastside (interior) grassland is Class III Priority Habitat.

Permanent disturbance of 1.1 acres of dwarf shrub-steppe and temporary disturbance of 8.9 acres. Dwarf shrub-steppe is Class II Priority Habitat.

Permanent disturbance of 1.4 acres of sagebrush shrub-steppe and temporary disturbance of 31.4 acres. Sagebrush shrub-steppe is Class II Priority Habitat.

Permanent disturbance of 717.2 acres of rabbitbrush shrubland and temporary disturbance of 152.3 acres. While rabbitbrush shrubland is not explicitly stated as a Class II habitat, the Applicant has agreed to consider this a Class II habitat based on discussions with the Washington Department of Fish and Wildlife (WDFW).

Priority Habitats are areas of conservation concern and have experienced continuous loss and degradation from anthropogenic development in Washington. As temporary and permanent impacts would result from the Project, EFSEC has proposed additional mitigation measures specific to offsetting impacts on Priority Habitat. Specifically, an as-built report and offset calculation would be required by the Applicant and would indicate the final temporary and permanent disturbance of Priority Habitat listed above and calculation of offsets required based on final temporary, permanent, and modified habitat impacts. EFSEC would determine the number of years that vegetation monitoring of temporary disturbance and modified habitat would be conducted and the success criteria for revegetation. The success criteria would include measurable parameters that the Applicant would apply to determine whether successful revegetation has occurred. In addition, a Detailed Site Restoration Plan has been recommended to provide the Revegetation Plan to be undertaken during decommissioning. The Detailed Site Restoration Plan would include provisions for adaptive management and would be updated based on lessons learned from implementing the Applicant's Revegetation Plan. These documents and associated monitoring reports provide a means to determine the effectiveness of revegetation and offset treatments. Chapter 4.5 Vegetation, Table 4.5-11 presents a summary of the habitat offset ratios provided by the Applicant in Appendix L (Habitat Mitigation Plan) of the ASC.

ES-4.5 Other Issues to Be Resolved: Other Agencies or Interested Parties Cooperation to Implement Mitigation

Recommended mitigation measures TR-5, TR-7, and TR-8 would involve the cooperation of other agencies to implement the required actions. Similarly, recommended mitigation measure CR-2 would involve discussions with affected Tribes (e.g., Yakama Nation). This could provide more detailed information about the impacts and

[5] Permanent disturbance is defined as habitat loss that would persist throughout the life of the Project and would not be restored when construction is complete (WDFW 2009).
[6] Temporary disturbance is defined as habitat loss that would end when construction is complete and the area would be restored to pre-construction conditions (WDFW 2009).

potential mitigation. EFSEC will work with the identified agencies, affected Tribes, or interested parties to facilitate cooperation in implementing identified mitigation measures.

ES-5 Public and Agency Involvement

EFSEC initiated a public involvement program, which included SEPA scoping, inter-agency coordination, and multiple public comment periods. Scoping is the first step in the SEPA environmental review process, to identify issues and concerns related to a proposed project, and thus to assist with identifying potential impacts and alternatives to analyze in the EIS. The scoping comment period for this EIS was May 11, 2021 to June 6, 2021. Members of the public, government agencies, tribes, and other interested stakeholders were invited to attend two scoping meetings/hearings and to submit comments verbally or written on comment forms during scoping meetings or by email or surface mail. EFSEC received approximately 370 comments from private citizens, environmental organizations, public agencies, and tribal representatives during the scoping period. EFSEC reviewed and considered these comments when determining the scope of the EIS. The Scoping Memo can be found on EFSEC's website (Horse Heaven SEPA | EFSEC - The State of Washington Energy Facility Site Evaluation Council).

EFSEC invited agency representatives with regulatory authority or special expertise with respect to environmental issues to assist in development of the Draft EIS. Representatives from the following agencies cooperated in developing the Draft EIS:

Washington Department of Fish and Wildlife (WDFW)

Washington Department of Ecology (Ecology)

Washington State Department of Transportation (WSDOT)

Washington State Department of Archaeology and Historic Preservation (DAHP)

Washington Utilities and Transportation Commission (UTC)

Washington Department of Natural Resources (DNR)

Washington State Department of Agriculture (WSDA)

ES-6 Next Steps

If EFSEC determines the project should be recommended to the Governor, the Council would develop an administrative order on recommendation (including any recommended pre-emption of local land use regulations) and a draft Site Certification Agreement (SCA) to be signed by the Governor. The SCA contains all of the environmental, social, economic, and engineering conditions the applicant must meet for construction and operation throughout the life of the project. Within 60 days of receipt of EFSEC's recommendation, the governor may approve the Facility, reject the Facility, or direct EFSEC to reconsider certain aspects of the project and draft SCA. If an Application for Site Certification is denied, the proposal cannot be constructed and operated. The date of the governor's ultimate decision is not currently known.

Following the Governor's approval, RCW 80.50 directs EFSEC to regulate the construction and operations of the Project through the SCA. The SCA lists the conditions the Applicant must meet during construction, while operating the facility, and through site restoration following a project's termination. For the entirety of a Project's lifespan, EFSEC is responsible for determining the Project's compliance with state laws and the terms set in the

SCA. The SCA for the Project would include, by reference, a comprehensive list of Applicant-committed measures and additional mitigation required by EFSEC. These additional measures may be identified through the SEPA process or through EFSEC's adjudicative process.. EFSEC ensures compliance through an environmental monitoring program that the agency administers for the duration of the Project's lifespan. EFSEC has the regulatory authority to enforce compliance with state laws and the conditions in the SCA through fines and other actions.

ES-7 Further Information about the Project

The following presents a hyperlink to the EFSEC Project web page: Horse Heaven Wind Project | EFSEC - The State of Washington Energy Facility Site Evaluation Council. The web page includes the following hyperlinks that catalog EFSEC's review of the Proposed Action:

Hyperlink to the Horse Heaven ASC

Hyperlink to site tour information

Hyperlink to public informational meeting and land use consistency hearing

Hyperlink to comments received

Hyperlink to EFSEC administrative orders

Hyperlink to Agency Correspondence

This Page Intentionally Left Blank

Attachment ES-3-1

EFSEC Recommended Mitigation Measures

This Page Intentionally Left Blank

EFSEC has identified the following additional and modified mitigation measures for the Project to avoid and/or minimize potential impacts:

Earth Resources

Geo-1[7]**:** To limit erosion and disturbance of natural soil profiles, soil disturbance would be postponed when soils are excessively wet, such as following a precipitation event.

In addition to the geology mitigation measures the following measures developed for the Vegetation chapter are applicable to geology:

Veg-7[8]**: Detailed Site Restoration Plan:** A Detailed Site Restoration Plan would be prepared and submitted for approval by EFSEC for final revegetation prior to Project decommissioning for the temporary and permanent disturbance areas, including modified habitat. The Restoration Plan would be a living document. It would include the methods, success criteria, monitoring, and reporting for revegetation at the end of the Project life. It would also include provisions for adaptive management and would be updated based on any lessons learned from implementing the Restoration Plan created for the temporary disturbance from Project construction (Appendix N, Horse Heaven Wind Farm, LLC 2021). This mitigation measure provides specifications on the Detailed Site Restoration Plan for decommissioning.

Air Quality

A-1[9]**:** Limit traffic speeds on unpaved areas to less than 15 mph, rather than the Applicant-proposed 25-mph limit. Access-road-related fugitive dust from construction vehicle traffic is the single largest source of PM_{10} and $PM_{2.5}$ emissions from Project construction. Road-related fugitive dust emissions increases with increasing vehicle speed. Consequently, one of the best management practices for mitigation of road-related fugitive dust emissions is to limit vehicle speed. The Applicant has proposed to limit vehicle speed to 25 mph. A lower vehicle speed limit of 15 mph is feasible and would further reduce fugitive PM_{10} and $PM_{2.5}$ emissions.

Water Resources

W-1[10]**: Least Risk Fish Windows:** Project construction and decommissioning within ephemeral and intermittent streams would observe the least risk windows for spawning and incubating salmonoids, which are, conservatively, August 1 to September 15 for the Yakima and Columbia Rivers and their tributaries in Benton County (WDFW 2018). This mitigation measure addresses potential impacts on surface water and fish habitat and would minimize risk to aquatic species.

W-2: Minimize Work in Heavy Rain: Project construction and decommissioning would be minimized during rainy periods and heavy rain—in particular, work near ephemeral or intermittent streams. This mitigation measure addresses potential impacts of surface water and runoff and would minimize the risk of sediment release to surface water and wetlands.

---

[7] Geo-: Identifier of numbered mitigation item for Geology

[8] Veg-: Identifier of numbered mitigation item for Vegetation

[9] A-: Identifier of numbered mitigation item for Air Quality

[10] W-: Identifier of numbered mitigation item for Water Resources

W-3: Check Dams: As indicated in Ecology (2019) BMP C207E, check dams cannot be placed or used in streams unless approved by WDFW. Check dams used for work within ephemeral or intermittent streams would be approved by EFSEC in coordination with WDFW and Ecology prior to use. Stream crossing designs and associated mitigation plans would be provided and approved by EFSEC in coordination with WDFW and Ecology. This mitigation measure addresses the use of check dams on site, which would require approval by WDFW and Ecology prior to use.

W-4: Culvert Installation BMPs: Based on the ASC, one culvert is proposed along one intermittent stream. Installation of the culvert would follow U.S. Department of Agriculture BMPs:

- Be oriented and aligned with the natural stream channel.
- Be constructed at or near natural elevation of the streambed to avoid or minimize potential flooding upstream of the crossing and erosion below the outlet.
- Use suitable measures to avoid or minimize water from seeping around the culvert.
- Use suitable measures to avoid or minimize culvert plugging from transported debris or bedload.
- Be regularly inspected and cleaned as necessary for the life of the Project (USDA 2012).
- Cover culvert with sufficient fill to avoid or minimize damage by traffic.
- Install culverts long enough to extend beyond the toe of the fill slopes to minimize erosion.

This mitigation measure addresses permanent impacts on ephemeral streams. It measures specifications on culvert installation to enable assessment of the potential impacts.

W-5: Employee Training: An employee training plan would be included as part of the SPCC Plan. For the duration of the Project, employees and workers on site would receive appropriate training according to the employee training plan to ensure that any spills are reported and responded to in an appropriate manner (Ecology 1999). This would include training on the use of spill response equipment and orientations identifying the location of hazardous materials, proper storage of hazardous materials, and location of spill response equipment to ensure that workers are competent in spill response. The mitigation measure addresses potential impacts on water quality including sedimentation and accidental spill. Employee training reduces the risk of human error and increases confidence in the effectiveness of spill response in the event of accidents such as an accidental spill.

W-6: Wetland SWPPP: A Stormwater Pollution Prevention Plan (SWPPP) would be designed specifically for work within the Micrositing Corridor adjacent to the wetland (Figure 3.4-1, Section 3.4). The SWPPP would include BMPs from the Stormwater Management Manual for Eastern Washington (Ecology 2019). The plan would include, but not be limited to, structural measures such as installation of silt fences and sediment ponds, and non-structural measures, including routine inspection and maintenance and enforcement of BMPs, to minimize surface water runoff generated from the construction activities to the wetland. The mitigation measure addresses potential impacts on the wetland situated near the Micrositing Corridor. The wetland is located downgradient from the construction area, so additional mitigation is proposed to avoid impacts.

W-7: Clear-Span 100-Year Floodplain: Clear-span the transmission line to avoid temporary disturbance to the 100-year flood plain. Site transmission line poles outside the 100-year floodplain. The mitigation measure addresses physical disturbance of the 100-year floodplain, a CARA. Clear-span would minimize physical disturbance.

W-8: Spill Response Equipment: Spill response equipment would be stored in every vehicle accessing the site during construction, operation, and decommissioning. In addition, an oil pan would be placed below heavy equipment when stored or not in use on site. The mitigation measure addresses spill response impacts by specifying locations for spill response equipment.

W-9: Minimize Water Use: During construction, operation, and decommissioning, water use would be minimized where possible. During drought or water shortage, schedule adjustment would be considered to minimize water needs on the site, where possible, or additional alternate off-site water supplies would be identified. The mitigation measure addresses impacts on public water supply and is proposed to minimize water use on site throughout the life of the Project.

W-10: Panel Washing: During drought or water shortage, panel washing would be postponed or alternate off-site water sources could be identified to minimize impacts on public water supply. Panel wash water would be recycled and re-used where possible during operations. The mitigation measure addresses impacts on public water supply and is proposed to minimize water use on site from panel washing, if required.

Vegetation

Veg-1: Tree Avoidance: Construction would avoid removing or disturbing trees within the Project Lease Boundary. Disturbance to trees includes any disturbance, including topping, within the drip-line of the tree (i.e., the area from the edge of the outermost branches), which preserves an intact root system. Disturbance within the drip-line of the tree should be avoided as this can lead to tree mortality. The avoidance area within the drip-line of trees in work areas should be delineated using snow fencing or similar measure to improve the visibility of avoidance zones. Trees cannot be removed without pre-approval. Where tree disturbance cannot be avoided by the Project (e.g., near transmission lines), the number and location of the trees would be provided to EFSEC, along with a statement justifying why avoidance cannot be achieved, and a mitigation plan. The mitigation plan would include replanting trees within the Lease Boundary to maintain the diversity of habitat structures provided by trees and would require approval by EFSEC prior to proceeding. This mitigation measure avoids physical disturbance to trees, which provides structural diversity for wildlife habitat.

Veg-2: Pre-Disturbance Surveys for Special Status Plant Species: Surveys for special status plant surveys would be conducted prior to clearing activities in areas of increased potential, including all Priority Habitat and areas identified by the Applicant as potential habitat for woven spore lichen. Surveys would be conducted by a qualified professional. Surveys would be conducted prior to both construction and decommissioning activities. All findings would be documented and provided to EFSEC. This mitigation measure minimizes potential impacts on special status plant species by providing an opportunity to modify the design to avoid any identified plants, prior to actual disturbance activities during construction and decommissioning prior to construction and decommissioning.

Veg-3: Special Status Plant Species Education: The environmental orientation provided to workers on site would include information on special status plant species. This would include diagnostic characteristics, suitable habitat descriptions, and photos of special status plant species with potential to occur within the Lease Boundary. A protocol would be established for any chance find by workers, who would notify the environmental monitor on site prior to proceeding with work. This mitigation measure minimizes impacts on special status plant species by educating workers in identification and suitable habitat.

Veg-4: As-Built Report and Offset Calculation: Within 60 days of completing construction, the Applicant would provide an as-built report that documents the amount of temporary and permanent disturbance associated with the Project. This would include associated maps and georeferenced spatial files. The as-built report would be factored into the final calculation of habitat offset based on the Applicant-provided ratios. The acreages of modified habitat planted for the Project under the solar arrays would also be included in this report. EFSEC would determine the number of years that vegetation monitoring of temporary disturbance and modified habitat would be conducted and the success criteria for revegetation. The success criteria would include measurable parameters that the Applicant would measure to determine whether successful revegetation has occurred. The Applicant would submit annual reports for each year of vegetation monitoring following construction to document the success of revegetation. At the end of the vegetation monitoring period, as determined by EFSEC, areas of modified habitat and revegetated temporary disturbance that have met the success criteria would be eligible for offset by the Applicant at the respective ratios. Any areas of modified habitat or temporary disturbance that do not meet the success criteria after completion of revegetation monitoring would be considered permanent disturbance, and this would be added to the offset requirement. This mitigation measure addresses habitat offset, by providing a final calculation of offset requirements based on actual disturbance.

Veg-5: Operation and Decommissioning Dust Control Plan: A dust control plan would be prepared for Project operation and decommissioning, similar to the dust control plan presented by the Applicant. The plan would minimize impacts on vegetation from dust during the operations and decommissioning stages of the Project. This mitigation measure minimizes indirect impacts from dust during operation and decommissioning.

Veg-6: Decommissioning Legislated Requirements: Mitigation measures that would be applied during decommissioning would follow the applicable legislated requirements at the time of decommissioning. This mitigation measure enables adjustment of requirements based on changes in legislation once decommissioning occurs, based on the requirements at that time.

Veg-7: Detailed Site Restoration Plan: The Detailed Site Restoration Plan (DSRP), required by WAC 463-72-050 would include a description of revegetation to be undertaken during decommissioning. The DSRP would be prepared and submitted for approval by EFSEC for final revegetation prior to Project decommissioning for the temporary and permanent disturbance areas, including modified habitat. The DSRP would be a living document. It would include the methods, success criteria, monitoring, and reporting for revegetation at the end of the Project life. It would also include provisions for adaptive management and would be updated based on any lessons learned from implementing the Revegetation Plan created for the temporary disturbance from Project construction (Appendix N, Horse Heaven Wind Farm, LLC 2021a). This mitigation measure provides specifications on the Detailed Site Restoration Plan for decommissioning.

Veg-8: Decommissioning Noxious Weed Management Plan: A Noxious Weed Management Plan (or extension of the current plan) to include prevention and control during decommissioning of the Project would be prepared. This Plan would include monitoring of the area for three years following decommissioning of the Project. This mitigation measure addresses noxious weeds during decommissioning. It is designed to minimize the introduction and spread of noxious weeds during decommissioning.

Wildlife and Habitat

Wild-1[11]**:** Upon completion of the two-year bird and bat post-construction fatality monitoring program, the Applicant would review the results with EFSEC and WDFW and determine whether additional monitoring and mitigation measures are necessary. The mitigation measure allows for continued monitoring and adaptive management of potential Project related wildlife mortalities.

Wild-2: All trash containers would be wildlife proof. The mitigation measure reduces potential human-wildlife conflicts thereby reducing potential Project related wildlife mortalities.

Wild-3: The Applicant would provide EFSEC a summary of the consultation undertaken with the USFWS regarding eagle mortality. The mitigation measure allows for continued monitoring and adaptive management of potential Project related impacts to eagles.

Wild-4: The Applicant would avoid the use of pesticides, including rodenticides, during Project construction and operation. If the use of pesticides is required, the Applicant would develop a management plan for submission to and approval by EFSEC that describes how the Applicant would avoid and/or otherwise minimize potential impacts on wildlife, including all potentially impacted special status species. The mitigation measure reduces potential impacts on habitat and wildlife mortality while allowing for adaptive management of potential Project related impacts.

Wild-5: The Applicant would limit construction disturbance by identifying sensitive areas on mapping and flagging any sensitive areas including wildlife features, such as wildlife colonies, active nests, dens, and wetlands in the field. The Applicant would conduct ongoing environmental monitoring during construction to ensure that flagged areas are avoided. The mitigation measure reduces potential loss of habitat and wildlife mortality.

Wild-6: The Applicant would maintain a database of road mortalities through construction and operation as part of the operational procedures. The Applicant would review road-based mortalities annually and propose additional mitigation for areas, under the control of the Applicant, with frequent mortalities or wildlife crossing observations. Additional mitigation measures may include speed control, signage, temporary road closures (e.g., during migration periods), or wildlife passageways. The mitigation measure allows for continued monitoring and adaptive management of potential Project related wildlife mortalities.

Wild-7: The Applicant would schedule construction activities to occur during daylight hours, when feasible, to reduce disturbance of nocturnal species and the need for nighttime lighting. The mitigation measure reduces disturbance to wildlife (i.e., indirect loss).

Wild-8: Wind turbine buffer zones would be established around all known raptor nests and be a minimum of 0.25 miles. The Applicant would prepare a Raptor Nest Monitoring and Management Plan for review by EFSEC and the TAC if buffer zones cannot be maintained. The mitigation measure reduces potential

[11] Wild-: Identifier of numbered mitigation item for Wildlife

impacts on habitat and raptor mortality while allowing allow for adaptive management of potential Project related impacts.

Wild-9: Vegetation clearing and grubbing would avoid local bird breeding periods, when feasible, to reduce potential destruction or disturbance of nesting birds. If avoidance of this period is not feasible, additional mitigation measures, such as pre-construction surveys for and buffering of active bird nests, would be undertaken. The mitigation measure avoids or reduces potential bird mortality.

Hab-1[12]**:** The Applicant would locate Project components, including roads and powerlines, outside of modeled movement corridors to the extent feasible. Rationale would be provided to EFSEC for siting components within movement corridors, and a Corridor Mitigation Plan would be required that describes:

- Extent of direct and indirect habitat impact within the movement corridor
- Proposed measures to be implemented to reduce potential impacts on movement corridors (e.g., habitat enhancements to promote continued use of corridors)
- Proposed features to accommodate wildlife movement for linear Project components (e.g., roads, powerlines)
- Proposed restoration in movement corridors following Project decommissioning

The mitigation measure reduces potential Project related barriers to wildlife movement while allowing for continued monitoring and adaptive management of potential Project related barriers.

Hab-2: Transmission line crossings of canyons and draws would be minimized. Where crossings are required, the Applicant would provide EFSEC with rationale for the crossings and propose additional mitigation measures to reduce potential barriers to movement and wildlife collisions. The mitigation reduces potential Project related barriers to wildlife movement while allowing for continued monitoring and adaptive management of potential Project related barriers.

Hab-3: Temporary laydown areas. Temporary laydown areas would be situated out of native shrub-steppe habitat. Where temporary disturbance of shrub-steppe habitat is required, the Applicant would provide EFSEC with rationale and propose additional mitigation measures to reduce habitat loss. The mitigation measure avoids and reduces impacts to habitat while allowing for adaptive management of potential Project related habitat loss.

Hab-4: The Applicant, in consultation with EFSEC, would establish a TAC. The TAC would be established at least one year prior to construction and would be responsible for reviewing and providing technical advice on documents produced by the Applicant related to wildlife and wildlife habitat. The TAC would also provide direction on adaptive management. The TAC would be responsible for, at a minimum:

- Providing input to, and review of, Project wildlife and habitat management plans (e.g., ferruginous hawk management plan),
- Review and provide advice to EFSEC on of pre-design and pre-construction data collection requirements to address Project mitigation measures and conditions of management plans

[12] Hab-: Identifier of numbered mitigation item for Habitat

- Review and provide advice to EFSEC on the final Project design
- Advising on thresholds to be applied to the Project that would trigger the requirement for additional mitigation measures
- Advising on the monitoring of mitigation effectiveness and reviewing monitoring reports
- Advising on additional or new mitigation measures that would be implemented by the Applicant to address exceedances of thresholds
- Reviewing the results of annual data generated from surveys and incidental observations and providing recommendations for alternative mitigation and adaptive management strategies, as well as advising on aspects of existing mitigation that are no longer needed

The mitigation measure avoids and reduces impacts to wildlife and habitat including habitat loss, wildlife disturbance, barriers to movement, and wildlife mortality; and allows for continued monitoring and adaptive management of potential Project related impacts.

Hab-5: As noted by the Applicant, the Project is expected to result in indirect habitat loss through loss of habitat function and changes in wildlife behavior in response to the Project. Further, as noted by the Applicant, WDFW guidelines require that compensatory habitat mitigation must fully offset the loss of habitat function and value. To address indirect habitat loss associated with the Project, the Applicant would develop an Indirect Habitat Loss Management Plan that addresses potential indirect habitat loss resulting from the Project. The Applicant would work with EFSEC and the Project TAC during the development of the Indirect Habitat Loss Management Plan (IHLMP) for review. EFSEC and the TAC would review the IHLMP prior to its implementation. The IHLMP would be provided to the TAC for review 90 days prior to construction.

The objectives of the IHLMP would be to identify Project-specific ZOI and required mitigation based on the Project-specific ZOI. The Project-specific ZOI would be developed based on Project conditions and may differ from the ZOI presented in the Draft EIS. The IHLMP would include:

- A description of the study's purpose and objectives
- A description of methods to define Project-specific ZOIs (e.g., gradient analysis, nest density)
- A description of data requirements to establish Project-specific ZOIs and field programs that would be implemented (pre-construction and post-operation)
- A description of the duration of studies required to establish Project-specific ZOIs
- A description of criteria to be used to compensate for loss of habitat function and value
- An environmental effectiveness monitoring strategy of compensatory habitat to ensure that the habitat meets success criteria

The IHLMP would also include a series of compensatory site-selection criteria, developed in consultation with the TAC. The selection criteria would be used to evaluate candidate habitat compensation habitats.

Habitats that achieve more of the criteria would be identified as the preferential sites. Selection criteria would include, at a minimum:

- Proximity to the Lease Boundary (e.g., hierarchy of preferences with respect to location—namely, within the Lease Boundary being the highest priority, adjacent to the Lease Boundary being the second highest priority, and off site being the third priority)
- Protection of existing native shrub-steppe or grassland habitats
- Encompassing sensitive or important wildlife habitat (e.g., mapped movement corridors, ferruginous hawk core habitat, habitat concentration areas, areas of high prey abundance)
- Proximity to Project infrastructure

The mitigation measure avoids and reduces disturbance to wildlife (indirect habitat loss) while allowing for ongoing monitoring, adaptive management, and offsetting of potential Project related impacts.

Hab-6: **Final Design:** The Applicant would work with the TAC and EFSEC on the development of the final Project layout and design including the application of Applicant commitments and recommended mitigation measures. The mitigation measure avoids and reduces potential habitat loss and disturbance to wildlife (indirect habitat loss).

Hab-7: All roadways constructed for the Project during the construction and operation phases would be removed and restored during decommissioning. The Applicant would provide EFSEC with rationale and propose additional mitigation measures if roadways are not decommissioned post-operation. The mitigation measure restores habitat post-operation and reduces habitat loss.

In addition to the wildlife and habitat mitigation measures the following measures developed for the Vegetation chapter are applicable to wildlife and habitat.

Veg-1: Tree Avoidance: Construction would avoid removing or disturbing trees within the Project Lease Boundary. Disturbance to trees includes any disturbance, including topping, within the drip-line of the tree (i.e., the area from the edge of the outermost branches), which preserves an intact root system. Disturbance within the drip-line of the tree should be avoided as this can lead to tree mortality. The avoidance area within the drip-line of trees in work areas should be delineated using snow fencing or similar measure to improve the visibility of avoidance zones. Trees cannot be disturbed or removed without pre-approval. Where disturbance trees by the Project cannot be avoided (e.g., near transmission lines), the number and location of the trees would be provided to EFSEC, along with a statement justifying why avoidance cannot be achieved, and a mitigation plan. The mitigation plan would include replanting trees within the Lease Boundary to maintain the diversity of habitat structures provided by trees and would require approval by EFSEC prior to proceeding. This mitigation measure avoids physical disturbance to trees, which provides structural diversity for wildlife habitat.

Veg-4: As-Built Report and Offset Calculation: Within 60 days of completing construction, the Applicant would provide an as-built report that documents the amount of temporary and permanent disturbance associated with the Project. This would include associated maps and georeferenced spatial files. The as-built report would be factored into the final calculation of habitat offset based on the Applicant-provided ratios. The acreages of modified habitat planted for the Project under the solar arrays would also be included in this report. EFSEC would determine the number of years that vegetation monitoring of temporary disturbance and modified habitat would be conducted and the success criteria for revegetation. The success criteria would include measurable parameters that the Applicant would measure to determine whether successful revegetation has occurred. The Applicant would submit annual reports for each year of vegetation monitoring following construction to document the success of revegetation. At the end of the vegetation monitoring period, as determined by EFSEC, areas of modified habitat and revegetated temporary disturbance that have met the success criteria would be eligible for offset by the Applicant at the respective ratios. Any areas of modified habitat or temporary disturbance that do not meet the success criteria after completion of revegetation monitoring would be considered permanent disturbance, and this would be added to the offset requirement. The mitigation measure addresses habitat offset by requiring a final calculation of offset requirements based on actual disturbance.

Veg-7: **Detailed Site Restoration Plan:** The Detailed Site Restoration Plan (DSRP) would include a description of revegetation to be undertaken during decommissioning. The DSRP would be prepared and submitted for approval by EFSEC for the final revegetation following Project decommissioning for the temporary and permanent disturbance areas, including modified habitat. The DSRP would be a living document. It would include the methods, success criteria, monitoring, and reporting for revegetation at the end of the Project's life. It would also include provisions for adaptive management and would be updated based on learnings from implementing the Revegetation Plan created for the temporary disturbance from Project Construction (Appendix N; Horse Heaven Wind Farm, LLC 2021a). This mitigation measure provides specifications on the Detailed Site Restoration Plan for decommissioning.

Recommended Mitigation Measures for Special Status Species

Table ES-6 summarizes the mitigation measures recommended by EFSEC that are specific to special status species. These measures, in combination with those described above, would reduce potential Project-related impacts on these species.

Table ES-6: Recommended Mitigation Measures for Special Status Species

Mitigation Identifier	Species Name	Species-specific Mitigation
Spec-1[13]	Striped whipsnake Sagebrush lizard	The Applicant would conduct pre-construction surveys for sensitive reptile species prior to alteration or destruction of suitable habitat such as areas within the Lease Boundary identified as core habitat in GAP mapping, as well as shrubland (e.g., shrub-steppe, rabbitbrush). WDFW would be contacted prior to undertaking these surveys. If these species are identified through pre-construction surveys, the Applicant would prepare a Reptile Management Plan to reduce potential impacts on habitat, mortality, and barriers to movement. The Reptile Management Plan would describe: ▪ How the Applicant would avoid suitable habitat, including where the species were observed ▪ How the Applicant would implement management recommendations in Larsen (1997) ▪ How the Applicant would maintain rodent burrows in suitable reptile habitat (e.g., shrub-steppe) ▪ Additional mitigation measures that would be implemented to reduce potential mortality of these species during the construction and operation stages of the Project The Reptile Management Plan would be reviewed by the TAC and approved by EFSEC prior to initiation of construction. Survey results and proposed adaptive management would be reviewed by the TAC prior to implementation (see Hab-4). The mitigation measure avoids and reduces potential striped whipsnake and sagebrush lizard habitat loss and mortality while allowing for adaptive management through Project construction and operation.
Spec-2	American white pelican	The Applicant would maintain a database of American white pelicans observed flying over or landing in the Project Lease Boundary. Observational data would be reviewed with the TAC annually, and adaptive management strategies would be applied as needed. The mitigation measure allows for adaptive management of potential American white pelican mortality through Project operation.
Spec-3	Eagles	The Applicant would obtain any required federal approvals. The Applicant would continue ongoing coordination with the USFWS (Eagle Coordinator, Columbia Pacific Northwest Region) regarding an eagle take permit for incidental take of bald and golden eagles and would continue to evaluate eagle risk to determine if an eagle take permit is appropriate considering the use of the Project by bald and golden eagles. Apply WDFW-recommended buffers for bald eagle and golden eagle nests (Larsen et al. 2004): ▪ Bald eagle - protected zone (400 feet) and conditioned zone (up to 800 feet beyond the protected zone) ▪ Golden eagle – 1.9 miles The mitigation measure avoids and reduces potential disturbance of eagle nests and eagle mortality.

[13] Spec – Identifier for numbered mitigation measure for Special Status Species (Wildlife)

Table ES-6: Recommended Mitigation Measures for Special Status Species

<table>
<tr><th>Mitigation Identifier</th><th>Species Name</th><th>Species-specific Mitigation</th></tr>
<tr><td>Spec-4</td><td>Burrowing owl</td><td>The Applicant would conduct burrowing owl surveys within areas of direct loss (permanent, temporary, and modified) and associated ZOIs. The results of these surveys would be provided to the TAC and EFSEC and used to inform the final Project layout.
Active burrows would be retained and satellite burrows with characteristics used by burrowing owls would be avoided where feasible to maintain habitat capacity.
Apply WDFW-recommended seasonal buffers (0.5 miles) (Larsen et al. 2004) for burrowing owl nests to avoid disturbing nesting burrowing owls, if present. Seasonal buffers (February 15 to September 25) would be applied during construction and for temporary disturbances, such as periodic maintenance, during operation.
If active burrowing owls are identified in the Lease Boundary, the Applicant would develop a species-specific management plan that describes:
The location of active burrows
How active burrows would be avoided through re-alignment or reconfiguration of Project features
Additional mitigation measures that would be applied where disturbance to active burrows is expected (e.g., construction of artificial burrows)
Ongoing monitoring of active burrows
The Burrowing Owl Management Plan would be reviewed by the TAC and approved by EFSEC prior to initiation of construction. Survey results and proposed adaptive management would be reviewed by the TAC prior to implementation (see Hab-4).
The Applicant would monitor access roads for burrowing owl use and mortalities. Mortalities would be reported to the TAC and EFSEC within 5 days of the observation. Incidental observations of burrowing owl use would be provided to the TAC on an annual basis.
The mitigation measure avoids and reduces potential loss of burrowing owl habitat, disturbance to burrowing owls, and burrowing owl mortality, while allowing for adaptive management through Project construction and operation.</td></tr>
<tr><td>Spec-5</td><td>Ferruginous hawk</td><td>The Applicant would avoid siting Project components within 2 miles of ferruginous hawk nests documented in PHS data and in Horse Heaven Wind Farm, LLC (2021a) to preserve foraging habitat. In the event that a Project component is sited within the 2-mile buffer, the Applicant would, in consultation with the TAC and approved by EFSEC, develop a Project-specific ferruginous hawk mitigation and management plan that includes:
A description of efforts to site Project infrastructure to avoid core habitat, identified as the area within 2 miles of nests documented in PHS data and Horse Heaven Wind Farm, LLC (2021a):<ol type="a">
If Project components are sited within 2 miles of a ferruginous hawk nest, the infrastructure would be reviewed by the TAC and approved by EFSEC.
Additional mitigation measures would be developed to reduce potential ferruginous hawk strikes with turbines, including curtailing turbine operation within the 2-mile core habitat of any actively occupied nests during the breeding and rearing periods when ferruginous hawks are present in Benton County.</td></tr>
</table>

Table ES-6: Recommended Mitigation Measures for Special Status Species

Mitigation Identifier	Species Name	Species-specific Mitigation
		c. The plan would explain how and where the Applicant would create offsetting habitat for direct and indirect habitat loss within the 2-mile core habitat of ferruginous hawk nests documented in PHS data and in Horse Heaven Wind, LLC (2021a). 2. A description of how construction activities would be undertaken to avoid sensitive timing periods for ferruginous hawk. 3. A description of pre- and post-monitoring programs, that would be conducted at active ferruginous hawk territories to establish: a. Habitat use in the Lease Boundary. b. Mapping of ground squirrel colonies and other prey items. c. Identification of potential flyways between nest sites and foraging habitat and monitoring of potential flyways to inform final turbine siting and orientation. d. Ongoing monitoring of nest occupation and success. 4. A description of restoration activities that would be undertaken in disturbed areas to enhance ferruginous hawk habitat during Project decommissioning. The mitigation measure avoids and reduces potential loss of ferruginous hawk habitat, disturbance to ferruginous hawk, and ferruginous hawk mortality, while allowing for adaptive management through Project construction and operation.
Spec-6	Great blue heron Sandhill crane Tundra swan	The Applicant would maintain a database of incidental observation of great blue heron, sandhill crane, and tundra swan foraging in the Lease Boundary during operation. Observational data and proposed adaptive management strategies would be reviewed with the TAC annually (see Hab-4). The Applicant would reduce the use of overhead power lines, where possible. The Applicant would apply buffers recommended in Larsen et al (2004)[a] sandhill crane feeding areas (0.5 miles) and roosting areas (0.3 miles), if documented in the Lease Boundary. The mitigation measure avoids and reduces potential disturbance to and mortality of great blue heron, sandhill crane and tundra swan, while allowing for adaptive management through Project construction and operation.
Spec-7	Loggerhead shrike Sagebrush sparrow Sage thrasher Vaux's swift	The Applicant would maintain connectivity between natural habitat patches to reduce potential habitat loss and fragmentation. The Applicant would restore areas with shrubs, where feasible, to reduce potential habitat loss. The Applicant would avoid the use of insecticides and herbicides to reduce potential mortality and loss of prey items. The Applicant would retain trees, shrubs, and hedgerows, as feasible, to reduce habitat loss. The Applicant would consult with the TAC and EFSEC if suitable habitat for loggerhead shrike, sagebrush sparrow, and sage thrasher cannot be avoided. If suitable habitat cannot be avoided, the Applicant would, in consultation with the TAC and approved by EFSEC, develop nest set back buffers that are supported by literature to be applied during clearing and grubbing activities. The Applicant would avoid clearing and grubbing during the active nesting period to reduce potential destruction of active nests and disturbance of nesting birds. If clearing and grubbing occurs during the nesting season, the Applicant would

Table ES-6: Recommended Mitigation Measures for Special Status Species

Mitigation Identifier	Species Name	Species-specific Mitigation
		conduct pre-clearing surveys for active nests and maintain appropriate setback buffers around active nests. Observational data and proposed adaptive management strategies would be reviewed with the TAC annually (see Hab-4). The mitigation measure avoids and reduces potential habitat loss, habitat fragmentation, and mortality to avoid and reduce impacts to loggerhead shrike, sagebrush sparrow, sage thrasher, and Vaux's swift. The measure allows for adaptive management through Project construction and operation.
Spec-8	Prairie falcon	The Applicant would conduct pre-construction surveys for prairie falcon nests for construction work proposed during the prairie falcon nesting season and maintain a seasonal buffer of 2,640 feet from active nest sites (Larsen et al. 2004) to reduce potential destruction or disturbance of active nests. Observational data and proposed adaptive management strategies would be reviewed with the TAC annually (see Hab-4). The mitigation measure avoids and reduces potential disturbance to prairie falcon, and prairie falcon mortality, while allowing for adaptive management through Project construction and operation.
Spec-9	Ring-necked pheasant	The Applicant would consider using native grasses and legumes that support ring-necked pheasant in seed mixes applied during post-construction restoration of temporary disturbances and decommissioning to reduce potential habitat loss (Larsen et al. 2004). Observational data and proposed adaptive management strategies would be reviewed with the TAC annually (see Hab-4). The mitigation measure reduces potential loss of ring-necked pheasant habitat and allows for adaptive management through Project construction and operation.
Spec-10	Black-tailed jackrabbit White-tailed jackrabbit	The Applicant would conduct surveys for jackrabbit in suitable habitat identified through GAP predictive mapping. If jackrabbits are identified, the Applicant would develop and implement a management plan with additional mitigation measures to reduce potential loss of habitat supporting jackrabbits. Observational data and proposed adaptive management strategies would be reviewed with the TAC annually (see Hab-4). The mitigation measure reduces potential loss of black-tailed and white-tailed jackrabbit habitat, indirect habitat loss, habitat fragmentation, and mortality, while allowing for adaptive management through Project construction and operation.
Spec-11	Townsend's big-eared bat	The Applicant would restrict bat access to open water if the water could be contaminated. The Applicant would retain old buildings, outbuildings, and trees where feasible. The Applicant would report mortalities of Townsend's big-eared bat to EFSEC and the TAC. Bat mortality data and adaptive management strategies would be reviewed with the TAC annually (see Hab-4). The mitigation measure reduces potential loss of Townsend's big-eared bat habitat and mortality and allows for adaptive management through Project construction and operation.

Table ES-6: Recommended Mitigation Measures for Special Status Species

Mitigation Identifier	Species Name	Species-specific Mitigation
Spec-12	Townsend's ground squirrel	The Applicant would conduct surveys for Townsend's ground squirrel colonies in areas of the Project disturbance footprint (including ZOI) to inform final design. The Applicant would consider how to avoid habitat loss within Townsend's ground squirrel habitat concentration areas, as well as known colonies in final design. Additional Townsend's ground squirrel colonies identified through surveys would be shown on Project mapping, and a species-specific management plan would be developed for areas where avoidance is not feasible. This plan would provide rationale for why colonies cannot be avoided and would provide additional mitigation measures, such as colony relocation and reconstruction of habitat features. The plans would be provided and discussed with the TAC, and approved by EFSEC, if avoidance of identified ground squirrel colonies is not feasible. Observational data and adaptive management strategies would be reviewed with the TAC annually. The mitigation measure reduces potential loss of Townsend's ground squirrel habitat, disturbance of squirrel colonies, and Townsend's ground squirrel mortality, while allowing for adaptive management through Project construction and operation.
Spec-13	Pronghorn antelope	The Applicant would limit fencing where feasible (e.g., around solar arrays). Final fencing layouts and design, including use of non-barbed-wire security fencing, would be provided to the TAC and EFSEC with rationale for fencing requirements. The Applicant would design and implement a study of seasonal pronghorn antelope occurrence and use of the Lease Boundary pre-construction and during operation to document the change, if any, of pronghorn antelope presence, abundance, and habitat use in the Lease Boundary. The TAC would review and provide input to the study design. The results of the study would be used to develop adaptive management measures to respond to changes in pronghorn antelope habitat use. Survey results and proposed adaptive management would be reviewed by the TAC prior to implementation (see Hab-4) The Applicant would maintain a database of pronghorn antelope observations, including details such as numbers, location, age, and sex, and would make this database available to WDFW, EFSEC, and the Yakama Nation. The mitigation measure reduces potential disturbance to pronghorn antelope and barriers to pronghorn antelope movement, while allowing for adaptive management through Project construction and operation.

Notes:
[a] Larsen et al. (2004) recommends buffers around great blue heron colonies, which do not occur in the Lease Boundary and does not provide recommended buffers for Tundra swan.
ASC = Application for Site Certification; EFSEC = Washington Energy Facility Site Evaluation Council; TAC = Technical Advisory Committee; USFWS = U.S. Fish and Wildlife Service; WDFW = Washington Department of Fish and Wildlife; ZOI = zone of influence

Summary of Milestones and Timing

Table ES-7 summarizes wildlife and habitat mitigation milestones and the timing of when milestones would be met.

Table ES-7: Summary of Milestones

Timing	Mitigation Measure	Milestone
Construction		
One year prior to construction	**Hab-4**	Establishment of TAC
During appropriate season within 1 year prior to construction	**Spec-1, 4, 8, 10, 12**	Pre-construction surveys
180 days prior to construction	**Hab-6**	Final design
90 days prior to construction	**Hab-1**	Corridor Mitigation Plan, if necessary
90 days prior to construction	**Hab-2**	Rational for and mitigation of canyon and draw crossings
90 days prior to construction	**Wild-8**	Raptor Nest Monitoring and Management Plan
90 days prior to construction	**Hab-5**	Indirect Habitat Loss Management Plan
90 days prior to construction, if needed	**Spec-5**	Ferruginous hawk mitigation and management plan
60 days prior to initiation of surveys (pre-construction).	**Spec-13**	Pronghorn antelope seasonal study
60 days prior to construction, if needed	**Spec 1, 4, 10, 12**	Species specific management plans
Prior to construction	**Wild-5**	Flagging sensitive features and habitat
Prior to construction	**Wild-9**	Pre-construction bird nest surveys, if necessary
Operation		
60 days post-construction	**Veg-4**	As-built report and offset calculation
Two years after commencement of operation	**Wild-1**	Review of PCFM results
Annually during operation	**Wild-6**	Review mortality database and provide mitigation
Annually during operation	**Spec-2, 4, 6, 7, 8, 9, 12**	Incidental databases
Annually during operation	**Spec-11**	Townsend's big-eared bat mortality database
Decommissioning		
60 days prior to initiation of decommissioning	**Veg-7**	Detailed Site Restoration Plan
60 days prior to initiation of decommissioning	**Hab-7**	Rational for and mitigation of remaining roadways, if any.

PCFM = post-construction fatality monitoring; TAC = Technical Advisory Committee

Energy and Natural Resources

ENR-1[14]**:** The Applicant would provide an executed agreement to EFSEC that identifies the source and quantity of water intended to be supplied to the Project prior to its construction, operation, and decommissioning.

ENR-2: The Applicant would install high-efficiency electrical fixtures and appliances in the O&M facility, BESSs, and substations to reduce energy needs for the Project's operations stage.

ENR-3: The Applicant would install high-efficiency security lighting to reduce energy needs for the Project's operations stage.

ENR-4: The Applicant would install low-water-use flush toilets in the O&M facilities to reduce the Project's water requirements during its operations stage.

ENR-5: The Applicant would capture and recycle wash water to reduce the Project's water requirements during its operations stage.

ENR-6: To retrieve as much of the natural resources used in construction and operation of the Project as possible, the Applicant would demolish or remove all Project-related equipment and facilities from the Lease Boundary. If the Applicant intends to leave any portion of the facility, including concrete foundations, they must submit a request to EFSEC in an update to their decommissioning plan.

ENR-7: To minimize the need for future extraction of natural resources, the Applicant would recycle all components of the Project that have the potential to be used as raw materials in commercial or industrial applications.

Land and Shoreline Use

LSU-1[15]**:** To limit conflicts between the Project and farmers and ranchers, the Applicant would prepare a livestock management plan with property owners and livestock owners to control the movement of animals within the Lease Boundary during construction and operation.

LSU-2: To limit conflicts between the Project and farmers, the Applicant would prepare a dryland farming management plan for construction, operation, and decommissioning that outlines communication requirements between the Certificate Holder and the land owners. The plan would establish work windows that would allow farmers uninterrupted access to their fields for dryland wheat planting and harvesting.

LSU-3: To limit conflicts between the Project and ranchers, the Applicant would be responsible for ensuring that arrangements for the removal of all livestock have been made during Project construction and decommissioning.

LSU-4: After construction is completed, the Applicant would restore all temporary disturbance areas to their preconstruction status. This would allow the areas of temporary disturbance within the Lease Boundary to return to their preconstruction agricultural production levels as soon as possible.

[14] ENR-: Identifier of numbered mitigation item for Energy and Natural Resources

[15] LSU-: Identifier of numbered mitigation item for Land and Shoreline Use

LSU-5: Prior to decommissioning, the Applicant would submit a Detailed Site Restoration Plan, per WAC 463-72-050, for restoring the site to its preconstruction character. This would assist in preventing conversion of a land use that is not in alignment with the Lease Boundary's current designation. The Applicant would be responsible for working with the landowner to return all agricultural land to its preconstruction status. If future site conditions or land ownership no longer allows for the land to be returned to agricultural production, the Applicant would submit a request to EFSEC for an alternative land use that would be in alignment with the Lease Boundary's preconstruction rural character and resource value. If the Detailed Site Restoration Plan requests an alternative land use, EFSEC may require that the Applicant provide additional mitigation to offset impacts from a permanent conversion of the land.

Historic and Cultural Resources

CR-1: Traditional Cultural Properties Mitigation: Ongoing engagement with affected Tribes is recommended to facilitate the locations of TCPs, to better quantify, and mitigate any potential impacts on them. Tribal review of site/engineering plans would provide input to guide design and avoidance, without confidential disclosure of locations. This engagement should also include opportunities to evaluate the effectiveness of any implemented mitigation measures throughout the Project's lifecycle. Appropriate mitigation measures may include (but are not limited to) the demarcation of "no-go," culturally sensitive areas to be avoided by contractors through Project redesign and/or refinement and/or the maintenance of safe access to TCPs and/or other places of cultural significance. If appropriate, the implementation of environmental enhancement measures (e.g., planting and/or screening) or the protection of certain aspects of the environmental setting, may be considered in participation with affected groups. The CTUIR (2021a, 2021b) proposed several mitigation strategies. Potential mitigation strategies include:

- Enabling continued access for Tribes through an Access Agreement (e.g., continued access to First Foods)
- Create protections for natural resources that support First Foods procurement (e.g., preserve landforms, practice responsible stream management, avoid negative impacts on pollinator species)
- Off-site mitigation, including education and outreach work, to assist Tribes in the perpetuation of oral history and legends that would have been taught in-situ in the Area of Analysis. Engagement with Tribes on appropriate rehabilitation (closure) strategies for the safe guarding of viewshed and cultural landscapes
- Tribal representatives to be included during any ground-disturbing activities (Cultural Resource Monitor)
- Develop an agreement with the Tribes in anticipation of a time when the wind farm would be considered for disassembly to restore the landscape and viewshed

CR-2: Archaeological and Architectural Resources Mitigation: Table ES-8 sets out proposed mitigation measures for archaeological and architectural resources potentially impacted by the Project. Any mitigation strategies should be detailed in an agreement document between EFSEC, DAHP, the Tribes, and the Project proponent.

Recommended mitigation measures are intended to minimize impacts on cultural resources with high sensitivity (unevaluated resources, precontact isolates, precontact sites, historic archaeological resources, and TCPs), primarily through avoidance. If avoidance is not possible, the recommended mitigation clarifies which resources would require a DAHP permit prior to disturbance. Recommended mitigation measures also identify instances where engagement with DAHP, Tribes, and/or landowners would be warranted.

Table ES-8: Summary of Recommendations for Archaeological and Architectural Resources Potentially Impacted by the Project

Resource ID	Resource Type	Eligibility for Protection/Listing (NRHP)	Recommendations
▪ 45BN2092 ▪ 45BN2146	Archaeological Resources (Precontact Isolates)	Confirmed isolates, not protected by RCW 27.53	▪ Any potential disturbance will not require a DAHP permit. ▪ Avoidance, through successful implementation of the APP preferred. ▪ In the event that the resources cannot be avoided. Further engagement with Tribes, DAHP, and landowners recommended.
▪ 45BN261 ▪ 45BN2090 ▪ 45BN2153 (precontact component)	Archaeological Resources (Precontact Archaeological Sites)	Protected by RCW 27.53	▪ Avoidance, through implementation of the APP. ▪ In the event resources cannot be avoided, a DAHP permit must be obtained to disturb them. ▪ In the event that the resources cannot be avoided. Further engagement with Tribes, DAHP, and landowners recommended.
▪ 45BN2081 ▪ 45BN2082 ▪ 45BN2083 ▪ 45BN2084 ▪ 45BN2091 ▪ 45BN2138 ▪ 45BN2144 ▪ 45BN2150 ▪ 45BN2155 ▪ 45BN2163	Archaeological Resources (Historic Isolates)	Not eligible for NRHP listing	▪ Negligible predicted impacts on resources. ▪ Avoidance not required. ▪ No further measures are recommended.
▪ 45BN2139 ▪ 45BN2156	Archaeological Resource (Historic Sites)	Not eligible for NRHP listing	▪ Negligible predicted impacts on resources. ▪ Avoidance not required. ▪ No further measures are recommended.

Table ES-8: Summary of Recommendations for Archaeological and Architectural Resources Potentially Impacted by the Project

Resource ID	Resource Type	Eligibility for Protection/Listing (NRHP)	Recommendations
▪ 45BN205 ▪ 45BN2085 ▪ 45BN2086 ▪ 45BN2087 ▪ 45BN2088 ▪ 45BN2089 ▪ 45BN2093 ▪ 45BN2140 ▪ 45BN2141 ▪ 45BN2142 ▪ 45BN2143 ▪ 45BN2145 ▪ 45BN2147 ▪ 45BN2148 ▪ 45BN2149 ▪ 45BN2151 ▪ 45BN2152 ▪ 45BN2153 (historic component) ▪ 45BN2154 ▪ 45BN2157 ▪ 45BN2158 ▪ 45BN2159 ▪ 45BN2160 ▪ 45BN2161 ▪ 45BN2162	Archaeological Resources (Historic Sites)	Unevaluated (potentially eligible for NRHP listing)	▪ Avoidance, through implementation of the APP. ▪ In the event resources cannot be avoided, the sites should be evaluated for their significance and eligibility for listing, with next steps determined in conjunction with DAHP.
▪ Farmstead ▪ Transmission Line 721665 ▪ 3152-S4 ▪ Roadway 667765	Architectural Resources	Evaluated as not eligible for NRHP listing	▪ Negligible predicted impacts on resources. ▪ Avoidance not required. ▪ No further measures are recommended.
▪ Transmission Line 721666 ▪ Grain Elevator 722995	Architectural Resources	Eligible for listing in the NRHP	▪ High predicted impacts. ▪ Avoidance required. ▪ No further measures are recommended.

Notes:
APP = Avoidance and Protection Plan; DAHP = Washington State Department of Archaeology and Historic Preservation; NRHP = National Register of Historic Places; RCW = Revised Code of Washington

Visual Aspects, Light and Glare

Visual Aspects Mitigation

VIS-1[16]**:** Relocate turbines located within the foreground distance zone (0 to 0.5 miles) of non-participating residences to avoid completely dominating views from these highly sensitive viewing locations. Siting the turbines further away would reduce the level of visual contrast and prominence (CESA 2011; BLM 2013).

VIS-2: Do not place piggyback advertising, cell antennas, commercial messages, or symbols on proposed wind turbines, as these have the potential to introduce additional visual contrast and would seem out of place in this natural-appearing agricultural landscape (BLM 2013).

VIS-3: Maintain clean nacelles and towers to avoid any spilled or leaking fluids accumulating dirt, which would contrast with the clean, white/gray wind turbines and result in increased visual contrast within the landscape (BLM 2013).

VIS-4: Use color-treated solar collectors and support structures to minimize color contrast with the existing landscape (BLM 2013).

VIS-4: Use color-treated solar collectors and support structures to minimize color contrast with the existing landscape (BLM 2013).

VIS-5: Avoid complete removal of vegetation beneath solar arrays during construction, where possible, to reduce contrast between the exposed soil and adjacent undisturbed areas during project operation. If site grading requires the removal of vegetation, the area will be revegetated and maintained during project operation (BLM 2013).

VIS-6: Install opaque fencing to directly screen views of the solar arrays where sited adjacent to viewpoints or residences. To allow the proposed fencing to blend into the setting, color-treat the fencing to minimize color contrast with the existing landscape (BLM 2013).

VIS-7: Design BESS to blend with the adjacent agricultural character, including selecting materials and paint colors to reduce contrast with the existing setting. By mimicking design characteristics of agricultural structures in the area, the BESS facilities would appear consistent with the area’s agricultural setting, including the overall visual scale of those existing structures (BLM 2013).

VIS-8: Maximize the span length across highways and other linear viewing locations to decrease visual contrast at the highway crossings. By moving the structures as far from the road as possible, the effect of those structures being located directly adjacent to these linear viewing locations would be reduced (BLM 2013).

VIS-9: Choose the type of proposed transmission structure (H-frame or monopole) to best match the adjacent transmission lines and to minimize visual clutter from the introduction of different structure types into the landscape, which would result in increased visual contrast (BLM 2013).

Shadow Flicker Mitigation

[16] Vis-: Identifier of numbered mitigation item for Visual Aspects

SF-1[17]**:** The Applicant would attempt to avoid, minimize, and mitigate shadow flicker at nearby residences. Shadow flicker can usually be addressed by planting trees, shading windows, or other mitigation measures. As a last resort, the control system of the wind turbine could be programmed to stop the blades during brief periods when conditions result in a perceptible shadow flicker.

SF-2: The Applicant would set up a complaint resolution procedure that will include the following: 1) A 24-hour "hot line" or other form of communication that the public can use to report any undesirable shadow flicker associated with the operation of the wind turbines, with the ability to log the date and time of a complaint. This line of communication would be maintained for at least one year, at which time it could be reassessed to continue or be terminated; 2) An attempt to contact the complainant within 24 hours; and 3) A requirement to report any complaints and their resolution to EFSEC during monthly reports to the Council.

Light Mitigation

LIG-1[18]**:** The Project would be constructed with LEED-certified building exterior(s) and security lighting to minimize vertical and horizontal illuminance to keep the lighting on site and to reduce impacts at the Lease Boundary and beyond.

Noise and Vibration

N-1[19]**:** Avoid laydown and equipment storage/parking areas closer than 2,500 feet from the nearest NSR location. These laydown and storage areas will have more noise sources for longer periods of time than other areas; therefore, setting these locations further from NSR locations will limit the sound level and the duration that such equipment can impact an NSR.

N-2: Limit large, noise-generating equipment operations, such as earth-moving equipment, cranes, and trucks, as outlined in Table 4.11-7, to daytime hours (between 7 a.m. and 10 p.m.), and limit the loudest and most impulsive pieces of construction equipment and activities, such as pile-driver operations and blasting, to typical working hours only: 7 a.m. to 6 p.m., Monday through Saturday. This measure would ensure that a typical workday would not include pile-driver operations or blasting during the evening hours (6 p.m. to 10 p.m.) but could include some on-site activities during nighttime hours such as early morning setup and preparation for the workday. Nighttime operations would be atypical. The purpose is to limit noise impacts during sensitive hours while allowing contractors some flexibility.

N-3: Monitor noise during nighttime operations (between 10 p.m. and 7 a.m.), when operations have the potential to impact NSRs to ensure that operations do not exceed state noise limits.

N-4: Update the Applicant's noise complaint resolution procedure to better address and respond to noise complaints. These updates should include the following: 1) Set up a 24-hour "noise hot line" or other form of communication that the public can use to report any undesirable noise conditions associated with the construction of the Project, with the ability to log the date and time of a complaint. This line of communication would be maintained through the end of construction; 2) Make an attempt to contact the

[17] SF-: Identifier of numbered mitigation item for Shadow Flicker

[18] LIG-: Identifier of numbered mitigation item for Light

[19] N-: Identifier of numbered mitigation item for Noise

complainant within 24 hours; 3) Require that any complaints and their resolution be reported to EFSEC during monthly reports to the Council.

N-5: Establish a noise complaint resolution procedure similar to that proposed for construction and decommissioning to better address and respond to noise complaints.

N-6: Maintain operation of the “noise hot line” (or similar) until the Project has been operational for at least one year at which time this can be reassessed to continue or be terminated.

Recreation

R-1[20]: To mitigate the loss of recreational activities due to the Project, the Certificate Holder would coordinate with DNR and Benton County to identify new recreational activities and/or improve existing recreational activities within the Lease Boundary (e.g., multi-use trails).

R-2: To mitigate the loss of uninterrupted views of scenic viewpoints, the Certificate Holder would provide a minimum of five informational boards approved by DNR and EFSEC at viewpoints associated with scenic areas of interest. These boards should include photographs of the viewshed prior to the construction of the Project and provide information regarding the decommissioning and reclamation of the Project’s footprint.

R-3: To mitigate the loss of safe recreation use for recreation enthusiasts, the Certificate Holder would coordinate with local and regional (when appropriate) recreation groups (e.g., the Northwest Paragliding Club, the Tri-City Bicycle Club) to develop and maintain an adaptive safety management plan to continue access to recreation activities in the Project area while keeping recreation enthusiasts safe. This plan should identify potential hazards within the Project Area (e.g., construction on or near common bicycle paths, no fly zones, etc.) and provide opportunities to identify or improve other similar recreation use areas to offset any recreation removed from the Project area as a result of the Project. Specific to paragliding, the Certificate Holder would perform outreach to other regional paragliding entities to share the safety management plan to ensure that recreationists are aware of the limitations the Project creates for safe landing and safe air space.

Public Health and Safety

Veg-1: Tree Avoidance: Construction would avoid removing or disturbing trees within the Project Lease Boundary. Disturbance to trees includes any disturbance, including topping, within the drip-line of the tree (i.e., the area from the edge of the outermost branches), which preserves an intact root system. Disturbance within the drip-line of the tree should be avoided as this can lead to tree mortality. The avoidance area within the drip-line of trees in work areas should be delineated using snow fencing or similar measure to improve the visibility of avoidance zones. Trees cannot be removed without pre-approval. Where tree disturbance cannot be avoided by the Project (e.g., near transmission lines), the number and location of the trees would be provided to EFSEC, along with a statement justifying why avoidance cannot be achieved, and a mitigation plan. The mitigation plan would include replanting trees within the Lease Boundary to maintain the diversity of habitat structures provided by trees and would

[20] R-: Identifier of numbered mitigation item for Recreation

require approval by EFSEC prior to proceeding. This mitigation measure avoids physical disturbance to trees, which provide structural diversity for wildlife habitat.

Transportation

TR-1[21]**:** To ensure safe practices during the transportation of materials during construction and decommissioning, the load movement team would review the procedures to be followed if the load should become lodged at a crossing and would review the emergency contact numbers for each crossing daily—that is, before starting travel for the day.

TR-2: To mitigate potential collisions at train crossings, the Applicant would work with WSDOT and Operation Lifesaver to provide train safety presentations to employees and contractors to increase knowledge regarding train safety, including train track crossings. Since this measure cannot be required by EFSEC, it cannot be considered fully effective mitigation for the purpose of this analysis.

TR-3: To ensure that no changes have occurred since the traffic analysis originally provided prior to construction, a third-party engineer would provide a traffic analysis prior to decommissioning. The traffic analysis would evaluate all modes of transportation (e.g., waterways, rail, roads, etc.) used for the movement of people and materials during decommissioning via the haul route(s) in Washington State.

TR-4: To ensure that no changes have occurred since the route survey originally provided prior to construction, all railroad crossing and grade changes would be included in a route survey performed by a third-party engineer with the Washington Utilities and Transportation Commission participating to determine if current traffic control systems at crossings are appropriate or if additional mitigation is needed prior to decommissioning. The route survey would include anticipated traffic counts. Since this measure cannot be required by EFSEC, it cannot be fully considered effective mitigation for the purpose of this analysis.

TR-5: The analysis of impacts from decommissioning is based on existing laws and regulations at the time when the ASC was submitted to EFSEC. To ensure that no changes have occurred to laws and regulations used in this analysis, the Applicant would consult with WSDOT and Benton County on the development of a decommissioning-stage Traffic and Safety Management Plan prior to decommissioning. The Traffic and Safety Management Plan must include a safety analysis of the WSDOT-controlled intersections (in conformance with the WSDOT Safety Analysis Guide) and recommend mitigation or countermeasures where appropriate. The analysis would review impacts from decommissioning traffic and be submitted to WSDOT for review and comment prior to decommissioning activities. Since this measure would require the participation of other agencies to be implemented, it cannot be considered fully effective mitigation for the purpose of this analysis. EFSEC would work with the identified agencies to facilitate cooperation in implementing this mitigation measure.

Public Services and Utilities

ENR-5: The Applicant would capture and recycle wash water to reduce the Project's water requirements during the operations stage.

[21] TR-: Identifier of numbered mitigation item for Transportation

ENR-7: To minimize the need for future extraction of natural resources, the Applicant would recycle all components of the Project that have the potential to be used as raw materials in commercial or industrial applications.

Additionally, EFSEC has identified the following mitigation measure that addresses the disposal of non-recyclable project components:

PSU-1[22]**:** To address the potential for the inappropriate disposal of Project waste, the Applicant would dispose of all non-recyclable Project components in an appropriately licensed waste disposal facility.

Socioeconomics

Socio-ec-1[23]**:** Prior to decommissioning, the Applicant would provide a new housing analysis that would include up-to-date housing information to determine if current socioeconomic analysis and Project impacts on housing are appropriate or if additional mitigation is needed to address temporary housing availability.

[22] PSU-: Identifier of numbered mitigation item for Public Services and Utilities

[23] Socio-ec-: Identifier of numbered mitigation item for Socioeconomics

Attachment ES-3-2

Tables ES-3a through ES-3c and Tables ES-4a through ES-4c

Summary of Potential Impacts of the Comprehensive Project and by Project Component during Construction, Operations and Decommissioning

This Page Intentionally Left Blank

Table ES-3a

Summary of Potential Impacts of Comprehensive Project during Construction of the Proposed Action

This Page Intentionally Left Blank

Table ES-3a: Summary of Potential Impacts of Comprehensive Project during Construction of the Proposed Action

Section	Topic	Description of Impact[a]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[b]	Significant Unavoidable Adverse Impacts[c]
Earth Resources (Section 4.2)	Geology	Adverse impacts on geology would occur from the installation of deep turbine foundations.	Low	Constant	Probable	Limited	No mitigation identified	None identified
Earth Resources (Section 4.2)	Soils	The disturbance to natural soil profiles could result in a temporary increase in localized soil erosion. These activities are likely to include site clearing, excavation, and backfilling. The construction and erection of turbine tower foundations would disturb soil resources as the contractor excavates unsuitable material from the Project area.	Low	Short Term	Unavoidable	Confined	**Geo-1:** Avoid construction during wet periods. **Veg-7:** Detailed Site Restoration Plan.	None identified
Earth Resources (Section 4.2)	Topography	Construction activities that would impact topography include excavation, grading, and cut-and-fill-slope development. Limited grading and/or placement of additional fill may be needed to obtain necessary grades for access roads, building foundations, and leveling the ground. Surface disturbance from construction-related activities would impact topography around each turbine.	Low	Short Term	Unavoidable	Confined	**Geo-1:** Avoid construction during wet periods.	None identified
Earth Resources (Section 4.2)	Earthquakes	Prolonged earthquake-induced ground shaking could cause minor damage to infrastructure if shaking has an intensity and duration that exceeds code-based structural seismic design levels.	Negligible	Temporary	Feasible	Confined	**Geo-1:** Avoid construction during wet periods.	None identified
Earth Resources (Section 4.2)	Landslide Hazards and Ground Instability	The Project site includes areas susceptible to landslides and bluff failures. Existing ground instability, high rainfall rates, and strong earthquake shaking could cause landslides.	Low	Temporary	Unlikely	Limited	**Geo-1:** Avoid construction during wet periods. **Veg-7:** Detailed Site Restoration Plan.	None identified

Notes:
Table continues below, notes apply to remainder of table
(a) Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.
(b) Mitigation measures listed here are additional actions that EFSEC could impose to further reduce the impacts. See Section 4.1 for details.
(c) Significant unavoidable impacts are those that would remain even after all identified additional mitigation measures have been required by EFSEC.
Applicant = Horse Heaven Wind Farm, LLC; ASC = Application for Site Certification; BESS = battery energy storage system; BMP = best management practice; dBA = A-weighted decibels; DNR = Washington State Department of Natural Resources; EFSEC = Washington Energy Facility Site Evaluation Council; mph = miles per hour; NRHP = National Register of Historic Places; NSR = noise sensitive receptor; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter; PM_{10} = particulate matter less than or equal to 10 microns in diameter; SWPPP = stormwater pollution prevention plan; TAC = Technical Advisory Committee; Tribes = Yakama Nation, the Confederated Tribes of the Umatilla Indian Reservation, the Nez Perce Tribe, and the Wanapum Tribe; USFWS = U.S. Fish and Wildlife Service; WDFW = Washington Department of Fish and Wildlife; ZOI = zone of influence

Table ES-3a: Summary of Potential Impacts of Comprehensive Project during Construction of the Proposed Action

Section	Topic	Description of Impact[(a)]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(b)]	Significant Unavoidable Adverse Impacts[(c)]
Earth Resources (Section 4.2)	Volcanic Activity	Hazards from ashfall to construction activities would include the following: ▪ Accumulation of ash on structures ▪ Clogging of electronics, machinery, and filters ▪ Suspension of abrasive fine particles in air and water ▪ Accumulation of ash on transportation routes and vegetation	Negligible	Temporary	Unlikely	Confined	**Geo-1:** Avoid construction during wet periods. **Veg-7:** Detailed Site Restoration Plan.	None identified
Air Quality (Section 4.3)	Air Quality	Adverse impacts on air quality may occur during construction from $PM_{2.5}$, PM_{10}, and fugitive dust	Low	Short Term	Probable	Confined	**A-1:** Limit speeds to less than 15 mph on dirt roads.	None identified
Water Resources (Section 4.4)	Physical Disturbance	Project construction would require temporary and permanent disturbance, which could impact surface water and wetlands, surface runoff/absorption, floodplains, and groundwater.	Low	Short Term (for temporary disturbance) Long Term (for permanent disturbance)	Unavoidable	Confined	**W-1:** Least Risk Fish Windows. **W-2:** Minimize Work in Heavy Rain. **W-3:** Check Dams. **W-4:** Culvert Installation BMPs. **W-6:** Wetland SWPPP. **W-7:** Clear-span 100-Year Floodplain.	None identified
Water Resources (Section 4.4)	Change in Water Quality	Project construction could result in a change to water quality of waterways that intersect or are located adjacent to Project construction activities.	Low	Temporary	Unlikely	Local	**W-1:** Least Risk Fish Windows. **W-2:** Minimize Work in Heavy Rain. **W-3:** Check Dams. **W-5** Employee Training. **W-6:** Wetland SWPPP. **W-8:** Spill Response Equipment.	None identified
Water Resources (Section 4.4)	Change in Hydrology – Temporary Disturbance	Temporary disturbance from Project construction within ephemeral and intermittent streams could result in changes to the hydrology of waterways.	Low	Short Term	Unlikely	Limited	**W-1:** Least Risk Fish Windows. **W-2:** Minimize Work in Heavy Rain. **W-3:** Check Dams. **W-4:** Culvert Installation BMPs.	None identified
Water Resources (Section 4.4)	Change in Hydrology – Permanent Disturbance	Project construction would require a culvert installation on one intermittent stream that could result in changes to the hydrology of the stream.	Low	Long Term	Unavoidable	Limited	**W-1:** Least Risk Fish Windows. **W-2:** Minimize Work in Heavy Rain. **W-3:** Check Dams. **W-4:** Culvert Installation BMPs.	None identified
Water Resources (Section 4.4)	Introduction of Hazardous Substances	Project construction could result in the introduction of hazardous substances that could impact surface water and wetlands, floodplains, and groundwater.	Low	Temporary	Unlikely	Local	**W-7:** Employee Training. **W-8:** Spill Response Equipment.	None identified
Water Resources (Section 4.4)[24]	Public Water Supply	Project construction activities would rely on water supplied by the City of Kennewick Public Works.	Medium	Temporary	Feasible	Regional	**W-9:** Minimize Water Use.	None identified

[24] Blue highlight identifies Impacts of Medium and High magnitude.

Table ES-3a: Summary of Potential Impacts of Comprehensive Project during Construction of the Proposed Action

Section	Topic	Description of Impact[(a)]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(b)]	Significant Unavoidable Adverse Impacts[(c)]
Vegetation (Section 4.5)	Loss of Extent of Priority Habitat – Temporary Disturbance	Site clearing associated with temporary disturbance would result in direct loss of acreage associated with WDFW Priority Habitat.	High	Short Term	Unavoidable	Limited	**Veg-1:** Tree Avoidance. **Veg-4:** As-Built Report and Offset Calculation.	None identified
Vegetation (Section 4.5)	Loss of Extent of Priority Habitat - Permanent Disturbance	Site clearing associated with permanent disturbance would result in direct loss of acreage associated with WDFW Priority Habitat.	High	Long Term	Unavoidable	Limited	**Veg-1:** Tree Avoidance. **Veg-4:** As-Built Report and Offset Calculation.	None identified
Vegetation (Section 4.5)	Loss of Extent Other Habitat – Temporary Disturbance	Site clearing associated with temporary disturbance would result in direct loss of acreage associated with other habitat.	Low	Short Term	Unavoidable	Confined	**Veg-1:** Tree Avoidance. **Veg-4:** As-Built Report and Offset Calculation.	None identified
Vegetation (Section 4.5)	Loss of Extent of Other Habitat – Permanent Disturbance	Site clearing associated with permanent disturbance would result in direct loss of acreage associated with other habitat.	Low	Long Term	Unavoidable	Confined	**Veg-1:** Tree Avoidance. **Veg-4:** As-Built Report and Offset Calculation.	None identified
Vegetation (Section 4.5)	Loss of Extent of Special Status Plant Species	Site clearing associated with the construction of the Project would result in direct loss of populations of special status plant species or their habitat.	Medium	Constant	Feasible	Local	**Veg-2:** Pre-Disturbance Surveys for Special Status Plant Species. **Veg-3:** Special Status Plant Species Education. **Veg-4:** As-Built Report and Offset Calculation.	None identified
Vegetation (Section 4.5)	Habitat Degradation	Construction activities could result in habitat degradation from introduction of hazardous material, surface runoff, introduction and spread of invasive plants or noxious weeds, and deposition of dust.	Low	Long Term	Feasible	Local	No mitigation identified	None identified
Vegetation (Section 4.5)	Habitat Fragmentation	Construction activities could result in habitat fragmentation from fire.	Low	Long Term	Feasible	Local	No mitigation identified	None identified
Wildlife and Habitat (Section 4.6)	Habitat Loss	The Project would result in the direct loss of habitat through construction of the Wind Energy Micrositing Corridor and associated transportation routes. The Project may also result in indirect habitat loss through increased noise, light, and human presence during construction.	Medium	Short Term for temporary disturbances (e.g., construction laydown areas) Constant for permanent footprint loss (e.g., turbine footprint)	Unavoidable	Local	**Wild-5:** Limit construction disturbance by identifying sensitive areas. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-3:** Temporary laydown areas. **Hab-4:** Develop TAC. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-1:** Tree Avoidance.	None identified

Table ES-3a: Summary of Potential Impacts of Comprehensive Project during Construction of the Proposed Action

Section	Topic	Description of Impact[(a)]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(b)]	Significant Unavoidable Adverse Impacts[(c)]
Wildlife and Habitat (Section 4.6)	Mortality of non-special status species	The Project may result in mortality of smaller animals (e.g., birds, herptiles, small mammals) during clearing and ground preparation works. Wildlife-vehicle collisions may occur during Project construction due to increased traffic.	Low	Short Term	Feasible	Confined	**Wild-1:** Review 2-year raptor and bat monitoring program. **Wild-2:** Use wildlife-proof trash containers. **Wild-3:** Review USFWS eagle mortality consultation. **Wild-4:** Avoid use of pesticides and rodenticides. **Wild-5:** Limit construction disturbance by identifying sensitive areas. **Wild-6:** Maintain database of road mortalities. **Wild-7:** schedule construction during daylight hours. **Wild-8:** Establish buffers around raptor nests. **Wild-9:** Time vegetation clearing outside of nesting season and provide mitigation for nesting birds. **Hab-4:** Develop TAC. **Hab-6:** Work with EFSEC on final Project layout and design.	None identified
Wildlife and Habitat (Section 4.6)	Barriers to movement and fragmentation	Turbines, power lines, roadways, and other linear infrastructure could create barriers to wildlife movement and fragment habitat. Barriers and fragmentation created during construction would predominantly remain through operation.	Low	Long Term	Probable	Confined	**Wild-5:** Limit activity disturbance by identifying sensitive areas. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-3**: Temporary laydown areas. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: striped whipsnake and sagebrush lizard	Impacts on shrub and shrub-steppe habitat may result in loss of suitable reptile habitat. Mortality of reptile species could occur during construction from heavy machinery and land clearing and grubbing.	Low	Constant	Feasible	Confined	**Wild-5:** Limit construction disturbance by identifying sensitive areas. **Wild-6**: Maintain database of road mortalities. **Hab-3**: Temporary laydown areas. **Hab-4:** Develop TAC. **Hab-6:** Work with EFSEC on final Project layout and design. **Spec-1:** Implement striped whipsnake and sagebrush lizard–specific mitigation.	None identified

Table ES-3a: Summary of Potential Impacts of Comprehensive Project during Construction of the Proposed Action

Section	Topic	Description of Impact[a]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[b]	Significant Unavoidable Adverse Impacts[c]
Wildlife and Habitat (Section 4.6)	Special status species: American white pelican	Construction of the Project may disturb American white pelicans moving over the Lease Boundary.	Negligible	Short Term	Unlikely	Limited	**Hab-3:** Temporary laydown areas. **Hab-4:** Develop TAC. **Hab-6:** Work with EFSEC on final Project layout and design. **Spec-2:** Implement American white pelican–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: bald eagle	Construction of the Project could disturb bald eagles, resulting in avoidance of the Project site.	Negligible	Short Term	Feasible	Confined	**Wild-1:** Review 2-year raptor and bat monitoring program. **Wild-2:** Use wildlife-proof trash containers. **Wild-3:** Review USFWS eagle mortality consultation. **Wild-4:** Avoid use of pesticides and rodenticides. **Wild-5:** Limit construction. disturbance by identifying sensitive areas. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-1:** Tree Avoidance. **Spec-3:** Implement eagle-specific mitigation.	None identified

Table ES-3a: Summary of Potential Impacts of Comprehensive Project during Construction of the Proposed Action

Section	Topic	Description of Impact[a]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[b]	Significant Unavoidable Adverse Impacts[c]
Wildlife and Habitat (Section 4.6)	Special status species: burrowing owl	Construction may result in direct and indirect habitat loss and the destruction of burrows (active, inactive, and potential). Mortality may occur during vegetation and ground-disturbing works.	Medium	Short Term (disturbance, mortality) Constant (habitat loss)	Feasible (mortality) Probable (disturbance) Unavoidable (Habitat loss)	Confined	**Wild-1**: Review 2-year raptor and bat monitoring program. **Wild-4**: Avoid use of pesticides and rodenticides. **Wild-5:** Limit construction disturbance by identifying sensitive areas. **Wild-6**: Maintain database of road mortalities. **Wild-7:** Schedule construction during daylight hours. **Wild-8**: Establish buffers around raptor nests. **Wild-9**: Time vegetation clearing outside of nesting season and provide mitigation for nesting birds. **Hab-3**: Temporary laydown areas **Hab-4:** Develop TAC. **Hab-6:** Work with EFSEC on final Project layout and design. **Spec-4**: Implement burrowing owl–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: ferruginous hawk	Construction of turbines and associated roads and power lines may result in the direct and indirect loss of habitat in core and range ferruginous hawk habitat. Nesting success could be impacted by construction activities proximal to the nest or activities change prey abundance.	High	Short Term (disturbance) Constant (habitat loss)	Probable (disturbance) Unavoidable (habitat loss)	Confined	**Wild-1:** Review 2-year raptor and bat monitoring program. **Wild-4:** Avoid use of pesticides and rodenticides. **Wild-5:** Limit construction disturbance by identifying sensitive areas. **Wild-6:** Maintain database of road mortalities. **Wild-8**: Establish buffers around raptor nests. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-3:** Temporary laydown areas. **Hab-4:** Develop TAC. **Hab-6:** Work with EFSEC on final Project layout and design. **Spec-5**: Implement ferruginous hawk specific–mitigation.	None identified

Table ES-3a: Summary of Potential Impacts of Comprehensive Project during Construction of the Proposed Action

Section	Topic	Description of Impact[(a)]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(b)]	Significant Unavoidable Adverse Impacts[(c)]
Wildlife and Habitat (Section 4.6)	Special status species: golden eagle	Construction of the Project could disturb golden eagles, resulting in avoidance of the Project site, though golden eagle nesting has not been reported within 10 miles of the Lease Boundary.	Negligible	Short Term	Unlikely	Confined	**Wild-1**: Review 2-year raptor and bat monitoring program. **Wild-2**: Use wildlife-proof trash containers. **Wild-3**: Review USFWS eagle mortality consultation. **Wild-4**: Avoid use of pesticides and rodenticides. **Wild-5:** Limit construction disturbance by identifying sensitive areas. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Veg-1:** Tree Avoidance. **Spec-3:** Implement eagle-specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: great blue heron and sandhill crane	Construction may disturb birds flying over the Lease Boundary, resulting in bird flight paths being diverted around the area. Construction may result in the loss of foraging habitat.	Negligible	Short Term (construction disturbance, construction mortality) Long Term (habitat loss)	Feasible (disturbance, mortality) Unavoidable (habitat loss)	Confined	**Wild-1**: Review 2-year raptor and bat monitoring program. **Wild-4**: Avoid use of pesticides and rodenticides. **Wild-5:** Limit construction disturbance by identifying sensitive areas. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Spec-6**: Implement great blue heron, sandhill crane, and tundra swan–specific mitigation.	None identified

Table ES-3a: Summary of Potential Impacts of Comprehensive Project during Construction of the Proposed Action

Section	Topic	Description of Impact[a]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[b]	Significant Unavoidable Adverse Impacts[c]
Wildlife and Habitat (Section 4.6)	Special status species: loggerhead shrike	Construction may result in direct and indirect (disturbance) habitat loss. Mortality may occur from interactions with machinery and destruction of nests.	Low	Short Term (construction disturbance, construction mortality) Constant (habitat loss)	Probable (disturbance, mortality) Unavoidable (Habitat loss)	Confined	**Wild-4**: Avoid use of pesticides and rodenticides. **Wild-5:** Limit disturbance by identifying sensitive areas. **Wild-6**: Maintain database of road mortalities. **Wild-7:** Schedule construction during daylight hours. **Wild-9**: Time vegetation clearing outside of nesting season and provide mitigation for nesting birds. **Hab-2:** Minimize transmission line crossings. **Hab-3**: Temporary laydown areas. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Spec-7:** Implement loggerhead shrike, sagebrush sparrow, sage thrasher, and Vaux's swift–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: prairie falcon	Construction of the Project is predicted to result in the direct loss of suitable foraging habitat for prairie falcon. Disturbance from construction activities may result in disturbance to prairie falcons.	Medium	Short Term (construction disturbance, construction mortality) Constant (habitat loss)	Probable (disturbance, mortality) Unavoidable (Habitat loss)	Confined	**Wild-1**: Review 2-year raptor and bat monitoring program. **Wild-4**: Avoid use of pesticides and rodenticides. **Wild-5:** Limit construction disturbance by identifying sensitive areas. **Wild-6**: Maintain database of road mortalities. **Wild-8**: Establish buffers around raptor nests. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-3**: Temporary laydown areas. **Hab-4:** Develop TAC. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-1:** Tree avoidance. **Spec-8**: Implement prairie falcon–specific mitigation.	None identified

Table ES-3a: Summary of Potential Impacts of Comprehensive Project during Construction of the Proposed Action

Section	Topic	Description of Impact[(a)]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(b)]	Significant Unavoidable Adverse Impacts[(c)]
Wildlife and Habitat (Section 4.6)	Special status species: ring-necked pheasant	Construction of the Project is predicted to result in the direct loss of suitable foraging habitat for ring-necked pheasant. Disturbance from construction activities may result in indirect habitat loss. Access roads may result in collisions with ring-necked pheasants.	Low	Short Term (construction disturbance, construction mortality) Long Term (habitat loss)	Probable (disturbance, mortality) Unavoidable (habitat loss)	Confined	**Wild-5:** Limit disturbance by identifying sensitive areas. **Wild-6**: Maintain database of road mortalities. **Wild-9**: Time vegetation clearing outside of nesting season and provide mitigation for nesting birds. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Spec-9**: Implement ring-necked pheasant–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: sagebrush sparrow sage thrasher	Construction may result in direct and indirect habitat loss. Mortality may occur from interactions with machinery and destruction of nests.	Low	Short Term (construction disturbance, construction mortality) Constant (habitat loss)	Probable (disturbance, mortality) Unavoidable (Habitat loss)	Confined	**Wild-4**: Avoid use of pesticides and rodenticides. **Wild-5:** Limit disturbance by identifying sensitive areas. **Wild-6**: Maintain database of road mortalities. **Wild-7:** Schedule construction during daylight hours **Wild-9**: Time vegetation clearing outside of nesting season and provide mitigation for nesting birds. **Hab-2:** Minimize transmission line crossings. **Hab-3**: Temporary laydown areas. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Spec-7:** Implement loggerhead shrike, sagebrush sparrow, sage thrasher, and Vaux's swift–specific mitigation.	None identified

Table ES-3a: Summary of Potential Impacts of Comprehensive Project during Construction of the Proposed Action

Section	Topic	Description of Impact[(a)]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(b)]	Significant Unavoidable Adverse Impacts[(c)]
Wildlife and Habitat (Section 4.6)	Special status species: tundra swan	Construction may result in the disturbance and loss of suitable foraging habitat and disruption of birds flying over the Lease Boundary.	Low	Short Term (construction disturbance, construction mortality) Long Term (habitat loss)	Feasible (disturbance, mortality) Unavoidable (habitat loss)	Confined	**Wild-1**: Review 2-year raptor and bat monitoring program. **Wild-4**: Avoid use of pesticides and rodenticides. **Wild-5:** Limit construction disturbance by identifying sensitive areas. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Spec-6**: Implement great blue heron, sandhill crane, and tundra swan–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: Vaux's swift	Construction of the Project could disturb Vaux's swift in flight over the Lease Boundary.	Negligible	Short Term	Unlikely	Confined	**Wild-4**: Avoid use of pesticides and rodenticides. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Spec-7:** Implement loggerhead shrike, sagebrush sparrow, sage thrasher, and Vaux's swift–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: black-tailed jackrabbit white-tailed jackrabbit	Construction of the Project is predicted to result in the direct loss of suitable habitat for jackrabbit. Disturbance from construction activities may result in indirect habitat loss. Access roads may result in collisions with jackrabbits, barriers to movement, and increased fragmentation.	Low	Short Term (construction disturbance, construction mortality) Constant (habitat loss)	Probable (disturbance, mortality) Unavoidable (habitat loss)	Confined	**Wild-4**: Avoid use of pesticides and rodenticides. **Wild-5:** Limit disturbance by identifying sensitive areas. **Wild-6**: Maintain database of road mortalities. **Hab-1:** Avoid corridors. **Hab-3**: Temporary laydown areas. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Spec-10:** Implement black and white-tailed jackrabbit–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: Townsend's big-eared bat	Construction activities could disturb Townsend's big-eared bat foraging in the Lease Boundary.	Negligible	Short Term	Feasible	Confined	**Wild-4**: Avoid use of pesticides and rodenticides. **Wild-7:** Schedule construction during daylight hours. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Spec-11:** Implement Townsend's big-eared bat–specific mitigation.	None identified

Table ES-3a: Summary of Potential Impacts of Comprehensive Project during Construction of the Proposed Action

Section	Topic	Description of Impact[a]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[b]	Significant Unavoidable Adverse Impacts[c]
Wildlife and Habitat (Section 4.6)	Special status species: Townsend's ground squirrel	Construction of the Project and associated access roads is predicted to result in the loss of suitable Townsend's ground squirrel habitat and destruction of colonies. Mortality may occur during construction work proximal to colonies and along access roads.	Medium	Short Term (construction disturbance, construction mortality) Constant (habitat loss)	Probable (disturbance, mortality) Unavoidable (habitat loss)	Confined	**Wild-4**: Avoid use of pesticides and rodenticides. **Wild-5:** Limit disturbance by identifying sensitive areas. **Wild-6**: Maintain database of road mortalities. **Hab-1:** Avoid corridors. **Hab-3**: Temporary laydown areas. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Spec-12:** Implement Townsend's ground squirrel–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: pronghorn antelope	Construction is predicted to result in direct loss of pronghorn antelope habitat. Activity associated with construction may result in indirect habitat loss. Increased traffic on existing and new access roads may result in pronghorn antelope mortality.	Medium	Short Term (construction disturbance) Constant (habitat loss)	Probable (disturbance) Unavoidable (habitat loss)	Confined	**Wild-5:** Limit disturbance by identifying sensitive areas. **Wild-6**: Maintain database of road mortalities. **Hab-1:** Avoid corridors. **Hab-3**: Temporary laydown areas. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Spec-13:** Implement pronghorn antelope–specific mitigation.	None identified
Energy (Section 4.7)	Consumption of Raw Materials and Commodities	The Project's construction would require metal and concrete for turbine, solar array, BESS, substations, and building construction and fuel for construction equipment and vehicles and various raw materials for manufacturing. The Project's construction water requirements would amount to approximately 3% of the annual water produced by Kennewick. Impact magnitude would increase from low to medium if the City of Kennewick Utility Services Division of Public Works is required to make adjustments to their water management plans.	Low to Medium (i.e., will increase if the City of Kennewick Utility Services Division of Public Works is required to make adjustments to their water management plans)	Short Term	Unavoidable	Local to Regional	**ENR-1:** Executed water supply agreement.	None identified

Table ES-3a: Summary of Potential Impacts of Comprehensive Project during Construction of the Proposed Action

Section	Topic	Description of Impact[(a)]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(b)]	Significant Unavoidable Adverse Impacts[(c)]
Land and Shoreline Use (Section 4.8)	Agriculture	Similar to Turbine Option 1 and solar arrays.	Low (decreased productivity) Medium (operational changes)	Temporary (brief access modifications) Short Term (seasonal restrictions)	Unavoidable	Limited (small area) Regional (decreased productivity)	**LSU-1:** The Applicant would prepare a livestock management plan. **LSU-2:** The Applicant would prepare a dryland farming management plan. **LSU-3:** Arrange for the removal of livestock.	None identified
Historic and Cultural Resources (Section 4.9)	Not Eligible Archaeological Historic Period Isolates and Sites	Impacts resulting in the partial or complete loss of non-sensitive resources of limited historical value.	Negligible	Constant	Probable	Confined	**CR-2:** Archaeological and Architectural Resources Mitigation	None identified
Historic and Cultural Resources (Section 4.9)	Unevaluated Archaeological Historic Period Isolates and Sites	Resources to be avoided through application of the APP. Without evaluation, magnitude of impact is high but is unlikely to occur due to the APP. Potential for the unplanned and accidental loss of unevaluated resources.	Medium	Constant	Unlikely	Confined	**CR-2:** Archaeological and Architectural Resources Mitigation	None identified
Historic and Cultural Resources (Section 4.9)	Not Eligible or Unevaluated Archaeological Precontact Period Isolates and Sites	Resources to be avoided through application of the APP. Impacts on environmental setting—visual, air quality and noise may occur.	High	Constant	Unlikely	Confined	**CR-2:** Archaeological and Architectural Resources Mitigation	Significant for partial or complete loss of archaeological isolates. However, discussions with affected Tribes and DAHP could provide more detailed information about the impacts and potential mitigation. This may change the impact significance rating.
Historic and Cultural Resources (Section 4.9)	Not Eligible Architectural Resources	Impacts resulting in the partial or complete loss of non-sensitive resources of limited historical value. Impacts on environmental setting of resources (visual etc.).	Negligible	Short Term	Probable	Local	**CR-2:** Archaeological and Architectural Resources Mitigation	None identified
Historic and Cultural Resources (Section 4.9)	Eligible Architectural Resources	Impacts on environmental setting of resources (visual etc.).	High	Short Term	Unavoidable	Local	**CR-2:** Archaeological and Architectural Resources Mitigation	None identified

Table ES-3a: Summary of Potential Impacts of Comprehensive Project during Construction of the Proposed Action

Section	Topic	Description of Impact[(a)]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(b)]	Significant Unavoidable Adverse Impacts[(c)]
Historic and Cultural Resources (Section 4.9)	Unknown/ Unidentified/Unevaluated Historic and Cultural Resources	Impacts potentially resulting in the partial or complete loss of significant resources that are unknown, unidentified, or unevaluated for the NRHP.	High	Constant	Feasible	Local	**CR-2:** Archaeological and Architectural Resources Mitigation	None identified
Historic and Cultural Resources (Section 4.9)	Traditional Cultural Properties	Impacts resulting in the partial or complete loss of resources. Impacts on environmental setting - inability to view cultural landscapes.	High	Constant	Probable	Regional	**CR-1:** Traditional Cultural Properties Mitigation	Significant for partial or complete loss of traditional cultural properties and resources. However, discussions with affected Tribes could provide more detailed information about the impacts and potential mitigation. This may change the impact significance rating.
Visual Aspects, Light and Glare (Section 4.10)	Visual Aspect	Activities would attract attention and would modify the existing landscape setting. Due to the additive effect of the different Project features, these impacts would affect a larger area.	Medium	Short Term	Probable	Regional	No mitigation identified	None identified
Visual Aspects, Light and Glare (Section 4.10)	Light	Activities would be completed mainly during daytime hours without the need for nighttime lighting.	Negligible	Temporary	Unlikely	Limited	No mitigation identified	None identified
Visual Aspects, Light and Glare (Section 4.10)	Glare	Activities could generate glare from construction equipment or solar panels.	Low	Temporary	Feasible	Confined	No mitigation identified	None identified
Noise and Vibration (Section 4.11)	Noise and Vibration – Construction Equipment	Most noise sensitive receptors would receive sound levels below 55 dBA during construction, with the potential to be up to 10 dBA over baseline. One noise sensitive receptor could receive sound levels at 55 dBA during construction of one turbine.	Medium	Temporary	Probable	Limited	**N-1:** Avoid laydown and equipment storage/parking areas near NSRs. **N-2:** Limit the use of noise-generating equipment to daytime hours (7 a.m. to 10 p.m.) and loud equipment to working hours (7 a.m. to 6 p.m.). **N-3:** Monitor noise during nighttime operations (10 p.m. to 7 a.m.) with the potential to impact NSRs. **N-4:** Set up a 24-hour “noise hot line” or similar and update the Applicant’s noise complaint resolution procedure to include contacting and reporting details.	None identified
Noise and Vibration (Section 4.11)	Noise and Vibration – Blasting	Sound levels can reach up to 140 dBA at blast locations and 90 dBA at 500 feet.	Low	Temporary	Feasible	Limited	**N-2:** Limit blasting to working hours (7 a.m. to 6 p.m.).	None identified

Table ES-3a: Summary of Potential Impacts of Comprehensive Project during Construction of the Proposed Action

Section	Topic	Description of Impact[(a)]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(b)]	Significant Unavoidable Adverse Impacts[(c)]
Recreation (Section 4.12)	Recreation – Use	Construction of the comprehensive Project would result in a high impact due to the restriction of access to public land and recreational activities that occur on public land within the Project's construction area. The impact would be long term for the duration of the life of the Project, unavoidable, and local.	High	Long Term	Unavoidable	Local	**R-1:** Work with DNR and Benton County to identify new recreational activities and/or improve existing recreational activities within Lease Boundary (e.g., multi-use trails). **R-2:** Provide informational boards, as approved by DNR and EFSEC, at viewpoints associated with scenic areas of interest. **R-3:** Work with the local and regional clubs to provide and maintain a plan to keep recreationists safe	None identified
Recreation (Section 4.12)	Recreation – Recreational Experience	Indirect impacts related to visual resources and noise could occur at recreation sites.	High	Long Term	Unavoidable	Regional	**R-2:** Provide informational boards, as approved by DNR and EFSEC, at viewpoints associated with scenic areas of interest.	None identified
Recreation (Section 4.12)	Recreation – Public Health and Safety	The Project's potential to affect the health and safety of recreationists using the area for paragliding, hang gliding, or biking would result in a medium impact.	Medium	Long Term	Unavoidable	Regional	**R-3:** Work with the Northwest Paragliding Club to provide and maintain a plan to keep recreationists safe.	None identified
Public Health and Safety (Section 4.13)	Fire (Worker Health and Safety)	Fire resulting from Project construction is unlikely, but wildfire risk in the area is considered high. For instance, combustible materials and lubricants are contained in the nacelle of the turbines. Diesel-powered generators may be used during construction. Use of these materials could pose a fire risk.	Medium	Temporary	Feasible	Limited	**Veg-1:** Pre-approval from EFSEC before topping or removal of trees that pose a hazard to collector lines	None identified
Public Health and Safety (Section 4.13)	Smoke and Haze (Public Health)	Fire resulting from Project construction is unlikely, but wildfire risk in the area is considered high. For instance, combustible materials and lubricants are contained in the nacelle of the turbines. Diesel-powered generators may be used during construction. Use of these materials could pose a fire risk.	Medium	Temporary	Feasible	Regional	**Veg-1:** Pre-approval from EFSEC before topping or removal of trees that pose a hazard to collector lines	None identified
Public Health and Safety (Section 4.13)	Release of Hazardous Materials	Hazardous materials, including diesel fuel, lubricating oils, hydraulic fluid, paints, and solvents would be used and stored on site. Spill kits would be maintained, minimizing the risk of a release if a spill were to occur.	Medium	Temporary	Unlikely	Limited	**Veg-1:** Pre-approval from EFSEC before topping or removal of trees that pose a hazard to collector lines	None identified

Table ES-3a: Summary of Potential Impacts of Comprehensive Project during Construction of the Proposed Action

Section	Topic	Description of Impact[(a)]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(b)]	Significant Unavoidable Adverse Impacts[(c)]
Transportation (Section 4.14)	Vehicular Traffic	Traffic volumes would increase measurably during transportation of material and equipment for the construction of the turbines. The potential for traffic volumes and slower, oversized roads would likely decrease level of service for intersections near the Lease Boundary and highways/ freeways. The increase in traffic volumes and the size of construction material may decrease roadway safety at intersections near the Project or on railroad crossings.	Medium	Short Term	Unavoidable	Regional	**TR-1:** Daily transport communication, including emergency numbers. **TR-2:** Operation Lifesaver safety presentation and training.	None identified
Public Services and Utilities (Section 4.15)	Wastewater	The amount of wastewater produced from the maximum number of temporary workers on site (467), while measurable, would not impact the ability of the local utility to treat the community's sewage.	Low	Short Term	Unavoidable	Local	No mitigation identified	None identified
Public Services and Utilities (Section 4.15)	Municipal Solid Waste	Solid waste from the Project's construction would consist of various quantities of non-hazardous construction wastes. The landfills identified in the ASC maintain substantial capacity that would be sufficient to serve the Project and the region, simultaneously.	Low	Constant	Unavoidable	Local to Regional (depending on location of landfill)	**ENR-7:** Recycle all applicable components. **PSU-1:** Use of a licensed waste disposal facility.	None identified
Public Services and Utilities (Section 4.15)	Safety	The impact on human health and wellbeing would result from a reduction in potable water in the surrounding community or the capability to management wastewater and construction debris.	Negligible	Temporary (accident) Constant (storage)	Unlikely	Limited to Regional (depending on location of disposal facility)	No mitigation identified	None identified

Table ES-3a: Summary of Potential Impacts of Comprehensive Project during Construction of the Proposed Action

Section	Topic	Description of Impact[a]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[b]	Significant Unavoidable Adverse Impacts[c]
Socioeconomics (Section 4.16)	Housing Availability	Phase 1 is anticipated to directly support an average monthly workforce of 300, and Phases 2a and 2b are anticipated to support an average monthly force of 267 and 271, respectively. The majority of construction workers would be sourced locally; however, the Project's construction would require the temporary and short-term relocation of non-local construction workers into the region. As reported in the 2019 American Community Survey 5-Year Estimate, rental vacancy rate in Benton County was 5.1%, with 1,660 units available for rent.	Negligible	Temporary to Short Term	Feasible	Regional	No mitigation identified	None identified
Socioeconomics (Section 4.16)	People of Color and Low-Income Populations	Disproportionate impacts on people of color and low income communities.	Negligible	Short Term	Unlikely	Confined to Regional	No mitigation identified	None identified

Notes:
(a) Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.
(b) Mitigation measures listed here are additional actions that EFSEC could impose to further reduce the impacts. See Section 4.1 for details.
(c) Significant unavoidable impacts are those that would remain even after all identified additional mitigation measures have been required by EFSEC.
Applicant = Horse Heaven Wind Farm, LLC; ASC = Application for Site Certification; BESS = battery energy storage system; BMP = best management practice; dBA = A-weighted decibels; DNR = Washington State Department of Natural Resources; EFSEC = Washington Energy Facility Site Evaluation Council; mph = miles per hour; NRHP = National Register of Historic Places; NSR = noise sensitive receptor; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter; PM_{10} = particulate matter less than or equal to 10 microns in diameter; SWPPP = stormwater pollution prevention plan; TAC = Technical Advisory Committee; Tribes = Yakama Nation, the Confederated Tribes of the Umatilla Indian Reservation, the Nez Perce Tribe, and the Wanapum Tribe; USFWS = U.S. Fish and Wildlife Service; WDFW = Washington Department of Fish and Wildlife; ZOI = zone of influence

Table ES-3b

Summary of Potential Impacts of Comprehensive Project during Operation of the Proposed Action

This Page Intentionally Left Blank

Table ES-3b: Summary of Potential Impacts of Comprehensive Project during Operation of the Proposed Action

Section	Topic	Description of Impact[a]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[b]	Significant Unavoidable Adverse Impacts[c]
Earth Resources (Section 4.2)	Geology	Impacts on the underlying basalt bedrock are not expected to include deep excavations that encounter geologic resources.	Negligible	Temporary	Feasible	Limited	No mitigation identified	None identified
Earth Resources (Section 4.2)	Soils	It is anticipated that no new ground disturbance would occur. Access roads and cleared areas could be susceptible to increased soil erosion from a lack of stabilizing vegetation or hard cover and prior disturbance of the local soil profile. Soil erosion, because of operations, would be limited to gravel-surfaced areas, including the apron constructed around each turbine.	Low	Temporary	Feasible	Limited	**Veg-7:** Detailed Site Restoration Plan.	None identified
Earth Resources (Section 4.2)	Topography	Facility operation would not require further excavation of existing ground surfaces or additional grading. Furthermore, it is anticipated that ground improvement techniques used during the construction stage would mitigate soils susceptible to erosion by improving their engineering performance and reducing their potential for settlement.	Negligible	Temporary	Unlikely	Limited	No mitigation identified	None identified
Earth Resources (Section 4.2)	Earthquakes	Prolonged earthquake ground shaking could cause minor damage to infrastructure if the intensity and duration of the shaking exceed code-based structural seismic design levels.	Low	Temporary	Feasible	Confined	No mitigation identified	None identified
Earth Resources (Section 4.2)	Landslide Hazards and Ground Instability	Existing ground instability, high rainfall rates, and strong earthquake shaking could cause landslides.	Low	Temporary	Feasible	Limited	**Veg-7:** Detailed Site Restoration Plan.	None identified
Earth Resources (Section 4.2)	Volcanic Activity	Ashfall and ash accumulation have the potential to reduce the photovoltaic-generated power of the solar panel as well as damage the solar arrays' components	Low	Temporary	Unlikely	Confined	No mitigation identified	None identified

Notes:
Table continues below, notes apply to remainder of table
[a] Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.
[b] Mitigation measures listed here are additional actions that EFSEC could impose to further reduce the impacts. See Section 4.1 for details.
[c] Significant unavoidable impacts are those that would remain even after all identified additional mitigation measures have been required by EFSEC.
Applicant = Horse Heaven Wind Farm, LLC; BESS = battery energy storage system; dBA = A-weighted decibels; DNR = Washington State Department of Natural Resources; EFSEC = Washington Energy Facility Site Evaluation Council; FAA = Federal Aviation Administration; FTE = full-time equivalent KOP = key observation point; LEED = Leadership in Energy and Environmental Design; mph = miles per hour; O&M = operations and maintenance; TAC = Technical Advisory Committee; USFWS = U.S. Fish and Wildlife; ZOI = zone of influence

Table ES-3b: Summary of Potential Impacts of Comprehensive Project during Operation of the Proposed Action

Section	Topic	Description of Impact[(a)]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(b)]	Significant Unavoidable Adverse Impacts[(c)]
Air Quality (Section 4.3)	Air Quality	Adverse impacts on air quality may result from operation and maintenance activities (primarily vehicular emissions).	Negligible	Short Term	Probable	Confined	**A-1:** Limit speeds to less than 15 mph on dirt roads.	None identified
Water Resources (Section 4.4)	Panel Washing	Project operations would require water to wash solar array panels, which would infiltrate the surrounding ground and could impact water resources.	Negligible	Temporary	Unlikely	Confined	**W-9:** Minimize Water Use. **W-10:** Panel Washing.	None identified
Water Resources (Section 4.4)	Surface Water Runoff from Impervious Surfaces	Project operations would increase impervious surfaces, which could lead to increased water runoff to water resources.	Low	Temporary	Unlikely	Local	No mitigation identified	None identified
Water Resources (Section 4.4)	Introduction of Hazardous Substances	Project operations could result in the accidental release of hazardous substances that could impact water resources.	Negligible	Temporary	Unlikely	Limited	**W-5:** Employee Training. **W-8:** Spill Response Equipment.	None identified
Water Resources (Section 4.4)	Impacts on Public Water Supply	Project operations would rely on water from public water supply for operations.	Low	Temporary	Feasible	Regional	**W-9:** Minimize Water Use. **W-10:** Panel Washing.	None identified
Vegetation (Section 4.5)	Vegetation Maintenance	During Project operation, vegetation may require maintenance, such as cutting or removal, for areas under the solar arrays, or along roadways.	Negligible	Long Term	Probable	Confined	No mitigation identified	None identified
Vegetation (Section 4.5)	Habitat Degradation	Project operations could result in habitat degradation from the introduction of hazardous substances, introduction and spread of noxious weeds and invasive plants, and deposition of dust.	Low	Long Term	Feasible	Local	**Veg-5:** Operation and Decommissioning Dust Control Plan.	None identified
Vegetation (Section 4.5)	Habitat Fragmentation	Project operations could result in habitat fragmentation from edge effects and fire.	Low	Long Term	Feasible	Local	**Veg-5:** Operation and Decommissioning Dust Control Plan.	None identified
Wildlife and Habitat (Section 4.6)[25]	Habitat loss	The Project would result in the direct loss of habitat through operation of the turbines and associated infrastructure. The Project may result in indirect habitat loss through degradation of habitat in ZOI created by disturbances (e.g., noise, light) from turbines and associated infrastructure.	Medium	Constant	Unavoidable	Local	**Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-1:** Tree Avoidance. **Veg-4:** As-built report and offset calculation.	None identified

[25] Blue highlight identifies Impacts of Medium and High magnitude.

Table ES-3b: Summary of Potential Impacts of Comprehensive Project during Operation of the Proposed Action

Section	Topic	Description of Impact[a]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[b]	Significant Unavoidable Adverse Impacts[c]
Wildlife and Habitat (Section 4.6)	Mortality of non-special status species	The Project may result in mortality of aerial species (birds and bats) through collisions with turbines, strikes with power lines, windows, and weather towers. Other sources of mortality on wildlife, including non-aerial species, include vehicle collisions and changes in food availability.	Medium	Long Term	Probable	Confined	**Wild-1:** Review 2-year raptor and bat monitoring program. **Wild-2:** Use wildlife-proof trash containers. **Wild-3:** Review USFWS eagle mortality consultation. **Wild-4:** Avoid use of pesticides and rodenticides. **Wild-6:** Maintain database of road mortalities. **Hab-4:** Develop TAC. **Hab-6:** Work with EFSEC on final Project layout and design.	None identified
Wildlife and Habitat (Section 4.6)	Barriers to movement and fragmentation	The operation of turbines, power lines, roadways, and other linear infrastructure could result in barriers to wildlife movement and fragment habitat. Barriers and fragmentation created during construction would predominantly remain through operation.	Medium	Long Term	Probable	Confined	**Wild-5:** Limit activity disturbance by identifying sensitive areas. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: Striped whipsnake and sagebrush lizard	Impacts on shrub and shrub-steppe habitat may result in loss of suitable reptile habitat. Increased road networks in the Lease Boundary could increase the risk of mortality for sagebrush lizard and striped whipsnake. Roadways may create barriers to reptile movement and further fragment reptile habitat.	Low	Constant	Feasible	Confined to Local	**Wild-6**: Maintain database of road mortalities. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation. **Spec-1:** Implement striped whipsnake and sagebrush lizard–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: American white pelican	American white pelicans have the potential for collision with turbines and electrocution with overhead transmission lines. American white pelicans could collide with solar arrays as literature suggests water-associated birds may attempt to land on solar arrays if they are mistaken for water (lake effect).	Medium	Long Term	Unlikely	Confined	**Wild-1**: Review 2-year raptor and bat monitoring program. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Spec-2**: Implement American white pelican–specific mitigation.	None identified

Table ES-3b: Summary of Potential Impacts of Comprehensive Project during Operation of the Proposed Action

Section	Topic	Description of Impact[a]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[b]	Significant Unavoidable Adverse Impacts[c]
Wildlife and Habitat (Section 4.6)	Special status species: bald eagle	Bald eagles are estimated to be the 17th most likely large bird to collide with the turbines, with an estimated exposure index of 0.01. Further, turbines could create barriers to bald eagle movement over the Lease Boundary.	Low	Long Term	Feasible	Confined	**Wild-1**: Review 2-year raptor and bat monitoring program. **Wild-2**: Use wildlife-proof trash containers. **Wild-3**: Review USFWS eagle mortality consultation. **Wild-4**: Avoid use of pesticides and rodenticides. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Spec-3:** Implement eagle-specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: burrowing owl	Permanent habitat loss from turbine footprint and roads would persist through operation. Operation of turbines could result in indirect burrowing owl habitat loss. Burrowing owls are not expected to collide with turbines, but are susceptible to road-based mortality. Further, changes in prey distribution and abundance may change foraging.	Medium	Constant	Unavoidable	Confined	**Wild-4**: Avoid use of pesticides and rodenticides. **Wild-6**: Maintain database of road mortalities. **Wild-8**: Establish buffers around raptor nests. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation **Spec-4**: Implement burrowing owl–specific mitigation.	None identified

Table ES-3b: Summary of Potential Impacts of Comprehensive Project during Operation of the Proposed Action

Section	Topic	Description of Impact[a]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[b]	Significant Unavoidable Adverse Impacts[c]
Wildlife and Habitat (Section 4.6)	Special status species: ferruginous hawk	Operation of the turbines could result in mortality due to collisions with turbines and power lines. Change in prey abundance may reduce hawk survivorship. Operation may also reduce the re-occupancy of nesting territories due to disturbance.	High	Constant	Feasible	Confined	**Wild-1**: Review 2-year raptor and bat monitoring program. **Wild-4**: Avoid use of pesticides and rodenticides. **Wild-6**: Maintain database of road mortalities. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation. **Spec-5**: Implement ferruginous hawk–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: golden eagle	Golden eagles are estimated to be the 22nd most likely large bird to collide with the turbines. Further, turbines could create barriers to golden eagle movement over the Lease Boundary.	Medium	Long Term	Feasible	Confined	**Wild-1**: Review 2-year raptor and bat monitoring program. **Wild-2**: Use wildlife-proof trash containers. **Wild-3**: Review USFWS eagle mortality consultation. **Wild-4**: Avoid use of pesticides and rodenticides. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Spec-3:** Implement eagle-specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: great blue heron and sandhill crane	The operation of wind turbines may result in great blue heron and sandhill crane mortality and disturbance.	Medium	Long Term	Feasible	Confined	**Wild-1**: Review 2-year raptor and bat monitoring program. **Wild-4**: Avoid use of pesticides and rodenticides. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Spec-6**: Implement great blue heron, sandhill crane, and tundra swan–specific mitigation.	None identified

Table ES-3b: Summary of Potential Impacts of Comprehensive Project during Operation of the Proposed Action

Section	Topic	Description of Impact[a]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[b]	Significant Unavoidable Adverse Impacts[c]
Wildlife and Habitat (Section 4.6)	Special status species: loggerhead shrike	Direct and indirect habitat loss would persist throughout Project operation. Loggerhead shrike mortality may occur due to strikes with turbines.	Medium	Constant	Unavoidable	Confined	**Wild-4**: Avoid use of pesticides and rodenticides. **Wild-6**: Maintain database of road mortalities. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation. **Spec-7:** Implement loggerhead shrike, sagebrush sparrow, sage thrasher, and Vaux's swift–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: prairie falcon	Direct habitat loss would persist throughout Project operation. Operation of the turbines may disturb prairie falcons foraging in the Lease Boundary. Operation of the turbines may result in mortality of prairie falcons. Changes in prey density may change habitat suitability and survivorship of prairie falcons.	Medium	Constant	Unavoidable	Confined	**Wild-1**: Review 2-year raptor and bat monitoring program **Wild-4**: Avoid use of pesticides and rodenticides. **Wild-6**: Maintain database of road mortalities. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation. **Spec-8**: Implement prairie falcon–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: ring-necked pheasant	Direct habitat loss would persist through Operation. Operation of the turbines may also result in indirect habitat loss. Ring-necked pheasant mortality may occur due to Project operation. Access roads may result in collisions with ring-necked pheasants.	Low	Long Term	Unavoidable	Confined	**Wild-6**: Maintain database of road mortalities. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Spec-9**: Implement ring-necked pheasant–specific mitigation.	None identified

Table ES-3b: Summary of Potential Impacts of Comprehensive Project during Operation of the Proposed Action

Section	Topic	Description of Impact[a]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[b]	Significant Unavoidable Adverse Impacts[c]
Wildlife and Habitat (Section 4.6)	Special status species: sagebrush sparrow and sage thrasher	Direct and indirect habitat loss would persist throughout Project operation.	Medium	Constant	Unavoidable	Confined	**Wild-4**: Avoid use of pesticides and rodenticides. **Wild-6**: Maintain database of road mortalities. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation. **Spec-7:** Implement loggerhead shrike, sagebrush sparrow, sage thrasher, and Vaux's swift specific–mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: tundra swan	Operation of turbines may result in the continued loss and disturbance of foraging habitat. Operation of Option 1 may result in tundra swan mortality through collision with turbines.	Low	Long Term	Feasible	Confined	**Wild-1**: Review 2-year raptor and bat monitoring program. **Wild-4**: Avoid use of pesticides and rodenticides. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Veg-4:** As-built report and offset calculation. **Spec-6**: Implement great blue heron, sandhill crane, and tundra swan–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: Vaux's swift	Vaux's swifts migrating over the Lease Boundary are susceptible to strikes during migration.	Low	Long Term	Feasible	Confined	**Wild-4**: Avoid use of pesticides and rodenticides. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Spec-7:** Implement loggerhead shrike, sagebrush sparrow, sage thrasher, and Vaux's swift–specific mitigation.	None identified

Table ES-3b: Summary of Potential Impacts of Comprehensive Project during Operation of the Proposed Action

Section	Topic	Description of Impact[a]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[b]	Significant Unavoidable Adverse Impacts[c]
Wildlife and Habitat (Section 4.6)	Special status species: black-tailed jackrabbit and white-tailed jackrabbit	Operation of the turbines may result in indirect loss of jackrabbit habitat and mortality along access roads. Direct habitat loss is expected to persist throughout operation.	Medium	Constant	Unavoidable	Confined	**Wild-4**: Avoid use of pesticides and rodenticides **Wild-6**: Maintain database of road mortalities **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation **Spec-10:** Implement black and white-tailed jackrabbit–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: Townsend's big-eared bat	Townsend's big-eared bat mortality may occur due to Project operation. Operation may result in indirect loss of foraging habitat.	Low	Long Term	Probable	Confined	**Wild-1**: Review 2-year raptor and bat monitoring program **Wild-4:** Avoid use of pesticides and rodenticides **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Spec-11:** Implement Townsend's big-eared bat–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: Townsend's ground squirrel	Townsend's ground squirrel mortality may continue along access roads during operation. Operation of the solar arrays may alter Townsend's ground squirrel behavior by providing shelter. Mortality may occur along access roads.	Medium	Constant	Feasible	Confined	**Wild-4:** Avoid use of pesticides and rodenticides **Wild-6:** Maintain database of road mortalities **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation. **Spec-12:** Implement Townsend's ground squirrel–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: pronghorn antelope	Operation of the Project may result in direct and indirect habitat loss to pronghorn antelope. Pronghorn antelope mortality may occur along maintenance roads.	Medium	Constant	Unavoidable	Confined	**Wild-6**: Maintain database of road mortalities. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation. **Spec-13:** Implement pronghorn antelope–specific mitigation.	None identified

Table ES-3b: Summary of Potential Impacts of Comprehensive Project during Operation of the Proposed Action

Section	Topic	Description of Impact[(a)]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(b)]	Significant Unavoidable Adverse Impacts[(c)]
Energy (Section 4.7)	Consumption of Raw Materials and Commodities	Project maintenance may require generator-specific lubricants and fluids produced outside the Project vicinity. O&M vehicles would need an ongoing supply of fuel purchased locally. Water for the Project's O&M facility and solar panel washing would be purchased from a local vendor and sourced from Kennewick. Aggregate for access road maintenance would be obtained locally.	Low to Medium	Long Term	Unavoidable	Local to Regional	**ENR-1:** Executed water supply agreement. **ENR-2:** Install high-efficiency electrical fixtures and appliances. **ENR-3:** Install high-efficiency security lighting. **ENR-4:** Install low-water-use flush toilets. **ENR-5:** Capture and recycle wash water.	None identified
Land and Shoreline Use (Section 4.8)	Agriculture	Impacts on agricultural activities from operation of the comprehensive Project would be similar to those presented for Turbine Option 1 and the solar arrays. However, when considering the impact of the comprehensive Project, the possibility for a conflict between the planned management of agricultural activities within the Lease Boundary and Project operations increases when compared with any individual component.	Low (decreased productivity) Medium (operational changes)	Long Term	Unavoidable	Limited (small area) Regional (decreased productivity)	**LSU-1:** The Applicant would prepare a livestock management plan. **LSU-2:** The Applicant would prepare a dryland farming management plan.	None identified
Historic and Cultural Resources (Section 4.9)	Eligible Architectural Resources	Impacts on environmental setting—visual, air quality and noise.	High	Constant	Unavoidable	Local	**CR-2:** Archaeological and Architectural Resources Mitigation	None identified
Historic and Cultural Resources (Section 4.9)	Traditional Cultural Properties	Impacts on environmental setting – visual, air quality, noise, and loss of access.	High	Constant	Probable	Regional	**CR-1:** Traditional Cultural Properties Mitigation	None identified
Historic and Cultural Resources (Section 4.9)	Unknown/ Unidentified Historic and Cultural Resources	Impacts potentially resulting in the partial or complete loss of significant (previously unidentified) resources.	High	Constant	Feasible	Local	**CR-2:** Archaeological and Architectural Resources Mitigation	None identified
Visual Aspects, Light and Glare (Section 4.10)	Visual Aspect	The proposed wind turbines, and comprehensive Project, would dominate views from many KOP locations, and the landscape would appear strongly altered.	High	Long Term	Unavoidable	Regional	**VIS-1**: Relocate turbines located within the foreground distance. **VIS-2**: No advertising, cell antennas, commercial messages, or symbols placed on wind turbines. **VIS-3**: Maintain clean nacelles and towers.	Significant for visual impacts
Visual Aspects, Light and Glare (Section 4.10)	Shadow Flicker	Wind turbines would create shadow flicker that would impact Project participants.	Medium	Long Term	Probable	Confined	**SF 1:** The Applicant would attempt to avoid, minimize and mitigate shadow flicker at nearby residences. **SF 2:** The Applicant would set up a complaint resolution procedure.	None identified

Table ES-3b: Summary of Potential Impacts of Comprehensive Project during Operation of the Proposed Action

Section	Topic	Description of Impact[a]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[b]	Significant Unavoidable Adverse Impacts[c]
Visual Aspects, Light and Glare (Section 4.10)	Light	Lighting for security purposes and to conform with FAA requirements would be visible outside the Lease Boundary but would have limited effect in terms of light trespass and sky glow degradation.	Low	Long Term	Unavoidable	Local	**LIG 1:** Use LEED-certified building exterior(s) and security lighting.	None identified
Visual Aspects, Light and Glare (Section 4.10)	Glare	Solar panels at all modeled receptors and vehicular routes are predicted to not experience glare as a result of Project operations; glare would not exceed FAA notice criteria, and a formal filing is not necessary.	Low	Long Term	Unavoidable	Confined	No mitigation identified	None identified
Noise and Vibration (Section 4.11)	Noise and Vibration – Operational Noise	Noise would be generated by the operation of wind turbines, inverters, transformers, and the corona effect.	Medium	Long Term	Unavoidable	Local	**N-5:** Establish a noise complaint resolution procedure similar construction. **N-6:** Maintain operation of the “noise hot line” for one year of Project operation.	None identified
Recreation (Section 4.12)	Recreation – Use	Operation of the comprehensive Project would result in a high impact due to the restriction of access to public land and recreational activities that occur on public land near the Project. The impact would be long term for the duration of the life of the Project, unavoidable, and local.	High	Long Term	Unavoidable	Local	**R-1:** Work with DNR and Benton County to identify new recreational activities and/or improve existing recreational activities within Lease Boundary (e.g., multi-use trails). **R-2:** Provide informational boards, as approved by DNR and EFSEC, at viewpoints associated with scenic areas of interest. **R-3:** Work with the local and regional clubs to provide and maintain a plan to keep recreationists safe	None identified
Recreation (Section 4.12)	Recreation – Recreational Experience	Impacts on noise receptors would be limited, while visual impacts would occur regionally.	Low	Long Term	Unavoidable	Regional	**R-2:** Provide informational boards, as approved by DNR and EFSEC, at viewpoints associated with scenic areas of interest.	None identified
Recreation (Section 4.12)	Recreation – Public Health and Safety	The Project’s potential to affect the health and safety of recreationists using the area for paragliding and hang gliding would results in a medium impact during the life of the Project. Impacts on recreationists would occur beyond neighboring receptors.	Medium	Long Term	Unavoidable	Regional	**R-3:** Work with the local and regional clubs to provide and maintain a plan to keep recreationists safe	Significant for paragliding and hang gliding public safety and health.
Public Health and Safety (Section 4.13)	Fire (Worker Health and Safety)	Lithium-ion batteries used for the BESSs may pose a risk of fire and explosion during operation because they may overheat, but the BESSs would include a fire suppression system.	Low to Medium (based on seasonal fire weather conditions)	Temporary	Feasible	Limited	No mitigation identified	None identified

Table ES-3b: Summary of Potential Impacts of Comprehensive Project during Operation of the Proposed Action

Section	Topic	Description of Impact[a]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[b]	Significant Unavoidable Adverse Impacts[c]
Public Health and Safety (Section 4.13)	Release of Hazardous Materials	Project elements include small amounts of oil and batteries, but a release is unlikely to occur during operations.	Negligible	Temporary	Unlikely	Limited	No mitigation identified	None identified
Transportation (Section 4.14)	Vehicular Traffic	Operation of the solar arrays may require water trucks to deliver wash water to clean the panels. A decrease in level of service is not expected, nor is roadway safety expected to decrease.	Low	Long Term	Probable	Local	**TR-2:** Operation Lifesaver safety presentation and training	None identified
Public Services and Utilities (Section 4.15)	Wastewater	Wastewater from the O&M facilities would be discharged to an on-site septic system. It is anticipated that the operations stage would use less than 5,000 gallons of water per day and that wastewater would be generated from kitchen and bathroom use.	Low	Long Term	Unavoidable	Local	**ENR-5:** Capture and recycle wash water.	None identified
Public Services and Utilities (Section 4.15)	Municipal Solid Waste	Operation of the Project is expected to generate approximately one or two dumpsters of waste per week at the O&M facilities.	Low	Constant	Unavoidable	Local to Regional (depending on location of landfill)	**PSU-1:** Use of a licensed waste disposal facility.	None identified
Socioeconomics (Section 4.16)	Housing Availability	The Proposed Action would generate or support up to 58 FTEs. A team of 16 to 20 personnel would be employed to operate and maintain Project components. As reported in the 2019 American Community Survey 5-Year Estimate, rental vacancy rate in Benton County was 5.1%, with 1,660 units available for rent.	Negligible	Long Term	Feasible	Regional	No mitigation identified	None identified
Socioeconomics (Section 4.16)	People of Color and Low-Income Populations	Disproportionate impacts on people of color and low income communities.	Negligible	Long Term	Unlikely	Confined	No mitigation identified	None identified

Notes:
[a] Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.
[b] Mitigation measures listed here are additional actions that EFSEC could impose to further reduce the impacts. See Section 4.1 for details.
[c] Significant unavoidable impacts are those that would remain even after all identified additional mitigation measures have been required by EFSEC.
Applicant = Horse Heaven Wind Farm, LLC; BESS = battery energy storage system; dBA = A-weighted decibels; DNR = Washington State Department of Natural Resources; EFSEC = Washington Energy Facility Site Evaluation Council; FAA = Federal Aviation Administration; FTE = full-time equivalent KOP = key observation point; LEED = Leadership in Energy and Environmental Design; mph = miles per hour; O&M = operations and maintenance; TAC = Technical Advisory Committee; USFWS = U.S. Fish and Wildlife; ZOI = zone of influence

Table ES-3c

Summary of Potential Impacts of Comprehensive Project during Decommissioning of the Proposed Action

This Page Intentionally Left Blank

Table ES-3c: Summary of Potential Impacts of Comprehensive Project during Decommissioning of the Proposed Action

Section	Topic	Description of Impact[a]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[b]	Significant Unavoidable Adverse Impacts[c]
Earth Resources (Section 4.2)	Geology	The likelihood of a foundation removal encountering bedrock is low. If bedrock were to be impacted during the decommissioning stage, then it would likely have already been encountered during the construction stage.	Low	Temporary	Probable	Limited	**Geo-1:** Avoid construction during wet periods. **Veg-7**: Detailed Site Restoration Plan.	None identified
Earth Resources (Section 4.2)	Soils	Decommissioning activities associated with the Project could impact and disturb the soil profile, due to excavating foundations and utilities, removing unsealed areas, restoring the original ground profile, and rehabilitating vegetation.	Low	Short Term	Unavoidable	Limited	**Geo-1:** Avoid construction during wet periods. **Veg-7**: Detailed Site Restoration Plan.	None identified
Earth Resources (Section 4.2)	Topography	The Applicant would restore the original topographic profile in areas of previous development.	Low	Short Term	Probable	Limited	**Geo-1:** Avoid construction during wet periods. **Veg-7**: Detailed Site Restoration Plan	None identified
Earth Resources (Section 4.2)	Earthquakes	Prolonged earthquake ground shaking could cause minor damage to infrastructure if the intensity and duration of the shaking exceed structural seismic design levels.	Negligible	Temporary	Feasible	Confined	**Geo-1:** Avoid construction during wet periods. **Veg-7**: Detailed Site Restoration Plan.	None identified
Earth Resources (Section 4.2)	Landslide Hazards and Ground Instability	Existing ground instability, high rainfall rates, and strong earthquake shaking could cause landslides.	Low	Temporary	Feasible	Limited	**Geo-1:** Avoid construction during wet periods. **Veg-7**: Detailed Site Restoration Plan.	None identified
Earth Resources (Section 4.2)	Volcanic Activity	Hazards from ashfall to decommissioning activities would include the following: ▪ Accumulation of ash on structures ▪ Clogging of electronics, machinery, and filters ▪ Suspension of abrasive fine particles in air and water ▪ Accumulation of ash on transportation routes and vegetation	Negligible	Temporary	Unlikely	Confined	**Geo-1:** Avoid construction during wet periods. **Veg-7**: Detailed Site Restoration Plan.	None identified

Notes:
Table continues below, notes apply to remainder of table
(a) Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.
(b) Mitigation measures listed here are additional actions that EFSEC could impose to further reduce the impacts. See Section 4.1 for details.
(c) Significant unavoidable impacts are those that would remain even after all identified additional mitigation measures have been required by EFSEC.
EFSEC = Energy Facility Site Evaluation Council; mph = miles per hour; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than 10 microns in diameter

Table ES-3c: Summary of Potential Impacts of Comprehensive Project during Decommissioning of the Proposed Action

Section	Topic	Description of Impact[a]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[b]	Significant Unavoidable Adverse Impacts[c]
Air Quality (Section 4.3)	Air Quality	Adverse impacts on air quality may occur during decommissioning from $PM_{2.5}$, PM_{10}, and fugitive dust	Low	Short Term	Probable	Confined	**A-1:** Limit speeds to less than 15 mph on dirt roads.	None identified
Water Resources (Section 4.4)	Physical Disturbance	Project decommissioning would result in physical disturbance that could impact surface water and wetlands, runoff and absorption capacity, floodplains, and groundwater resources.	Low	Short Term	Unavoidable	Confined	**W-1:** Least Risk Fish Windows. **W-2:** Minimize Work in Heavy Rain. **W-3:** Check Dams. **W-6:** Wetland SWPPP.	None identified
Water Resources (Section 4.4)	Change in Water Quality	Project decommissioning would require temporary disturbance, which could impact water quality.	Low	Temporary	Unlikely	Local	**W-1:** Least Risk Fish Windows. **W-2:** Minimize Work in Heavy Rain. **W-3:** Check Dams. **W-5:** Employee Training. **W-6:** Wetland SWPPP. **W-8:** Spill Response Equipment.	None identified
Water Resources (Section 4.4)	Change in Hydrology	Project decommissioning would require temporary disturbance to some ephemeral and intermittent streams but would restore the disturbance areas following decommissioning.	Low	Short Term	Unlikely	Limited	**W-3:** Check Dams.	None identified
Water Resources (Section 4.4)	Introduction of Hazardous Substances	Project decommissioning could result in the introduction of hazardous substances to water resources.	Low	Temporary	Unlikely	Local	**W-5:** Employee Training. **W-8:** Spill Response Equipment.	None identified
Water Resources (Section 4.4)	Impacts on Public Water Supply	Project decommissioning could result in impacts on public water supply.	Low	Temporary	Unlikely	Regional	**W-9:** Minimize Water Use.	None identified
Vegetation (Section 4.5)[26]	Loss of Extent of Priority Habitat – Temporary Disturbance	Decommissioning of the Project would require temporary disturbance areas to remove Project components, which would result in direct loss of WDFW Priority Habitat.	High	Short Term	Unavoidable	Limited	**Veg-1:** Tree Avoidance. **Veg-6:** Decommissioning Legislated Requirements. **Veg-7:** Detailed Site Restoration Plan. **Veg-8:** Decommissioning Noxious Weed Management Plan.	None identified

[26] Blue highlight identifies Impacts of Medium and High magnitude.

Table ES-3c: Summary of Potential Impacts of Comprehensive Project during Decommissioning of the Proposed Action

Section	Topic	Description of Impact[a]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[b]	Significant Unavoidable Adverse Impacts[c]
Vegetation (Section 4.5)	Loss of Extent Other Habitat – Temporary Disturbance	Site clearing associated with temporary disturbance would result in direct loss of acreage associated with other habitat.	Low	Short Term	Unavoidable	Confined	**Veg-1:** Tree Avoidance. **Veg-6:** Decommissioning Legislated Requirements. **Veg-7:** Detailed Site Restoration Plan. **Veg-8:** Decommissioning Noxious Weed Management Plan.	None identified
Vegetation (Section 4.5)	Loss of Extent Special Status Plant Species	Site clearing associated with decommissioning of the Project would result in direct loss of populations of special status plant species or their habitat.	Low	Constant	Unlikely	Local	**Veg-2:** Pre-Disturbance Surveys for Special Status Plant Species. **Veg-6:** Decommissioning Legislated Requirements. **Veg-7:** Detailed Site Restoration Plan. **Veg-8:** Decommissioning Noxious Weed Management Plan.	None identified
Vegetation (Section 4.5)	Habitat Degradation	Project decommissioning could result in habitat degradation from the introduction of hazardous material, surface runoff, introduction or spread of invasive plant or noxious weeds, and the deposition of dust.	Low	Long Term	Feasible	Local	**Veg-5:** Operation and Decommissioning Dust Control Plan. **Veg-6:** Decommissioning Legislated Requirements. **Veg-7:** Detailed Site Restoration Plan. **Veg-8:** Decommissioning Noxious Weed Management Plan.	None identified
Vegetation (Section 4.5)	Habitat Fragmentation	Project decommissioning could result in habitat fragmentation from fire.	Low	Long Term	Feasible	Local	**Veg-6:** Decommissioning Legislated Requirements.	None identified
Wildlife and Habitat (Section 4.6)	Habitat loss	The Project would result in temporary loss of habitat during decommissioning. No new permanent habitat loss is expected, and restoration activities are expected to replace and/or enhance habitat loss created during construction and operation.	Negligible	Short Term	Unavoidable	Local	**Wild-5:** Limit construction disturbance by identifying sensitive areas. **Hab-7:** Roadway decommissioning. **Veg-1:** Tree Avoidance. **Veg-7:** Detailed Site Restoration Plan.	None identified

Table ES-3c: Summary of Potential Impacts of Comprehensive Project during Decommissioning of the Proposed Action

Section	Topic	Description of Impact[a]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[b]	Significant Unavoidable Adverse Impacts[c]
Wildlife and Habitat (Section 4.6)	Mortality of non-special status species	Sources of wildlife injuries and mortalities during decommissioning include collisions with equipment; removal of nuisance wildlife; destruction of nests, dens, and burrows; and habitat loss. The risk of mortalities would be limited to the duration of decommissioning.	Negligible	Short Term	Feasible	Confined	**Wild-1**: Review 2-year raptor and bat monitoring program. **Wild-2**: Use wildlife-proof trash containers. **Wild-3**: Review USFWS eagle mortality consultation. **Wild-4**: Avoid use of pesticides and rodenticides. **Wild-5:** Limit activity disturbance by identifying sensitive areas. **Wild-6**: Maintain database of road mortalities. **Wild-7:** Schedule activities during daylight hours. **Wild-8**: Establish buffers around raptor nests.	None identified
Wildlife and Habitat (Section 4.6)	Barriers to movement and fragmentation	Decommissioning would remove Project-related barriers to movement and reduce habitat fragmentation by removing infrastructure and revegetating disturbed areas.	Negligible	Short Term	Feasible	Confined	**Wild-5:** Limit activity disturbance by identifying sensitive areas. **Hab-7:** Roadway decommissioning. **Veg-7:** Detailed Site Restoration Plan.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: striped whipsnake and sagebrush lizard	Ground disturbance and machinery use during Project decommissioning could result in mortality of striped whipsnake and sagebrush lizard.	Negligible	Short Term	Feasible	Confined	**Wild-5:** Limit construction disturbance by identifying sensitive areas. **Wild-6**: Maintain database of road mortalities. **Hab-4:** Develop TAC. **Hab-7:** Roadway decommissioning **Veg-7:** Detailed Site Restoration Plan. **Spec-1:** Implement striped whipsnake and sagebrush lizard–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: American white pelican	Decommissioning of the Project may disturb American white pelicans moving over the Lease Boundary.	Negligible	Short Term	Unlikely	Confined	**Hab-4:** Develop TAC. **Spec-2**: Implement American white pelican–specific mitigation.	None identified

Table ES-3c: Summary of Potential Impacts of Comprehensive Project during Decommissioning of the Proposed Action

Section	Topic	Description of Impact[a]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[b]	Significant Unavoidable Adverse Impacts[c]
Wildlife and Habitat (Section 4.6)	Special status species: bald eagle	Decommissioning of the Project could disturb bald eagles, resulting in avoidance of the Project site.	Negligible	Short Term	Feasible	Confined	**Wild-2**: Use wildlife-proof trash containers. **Wild-3**: Review USFWS eagle mortality consultation. **Wild-4**: Avoid use of pesticides and rodenticides. **Wild-5:** Limit construction disturbance by identifying sensitive areas. **Veg-1:** Tree Avoidance. **Hab-4:** Develop TAC. **Spec-3:** Implement eagle-specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: burrowing owl	Decommissioning may result in mortality from machinery operation over the Lease Boundary.	Negligible	Short Term	Unlikely	Confined	**Wild-1**: Review 2-year raptor and bat monitoring program. **Wild-4**: Avoid use of pesticides and rodenticides. **Wild-5:** Limit construction disturbance by identifying sensitive areas. **Wild-6**: Maintain database of road mortalities. **Wild-7:** Schedule activity to daylight hours. **Wild-8**: Establish buffers around raptor nests. **Hab-4:** Develop TAC. **Hab-7:** Roadway decommissioning. **Veg-7:** Detailed Site Restoration Plan. **Spec-4**: Implement burrowing owl–specific mitigation.	None identified

Table ES-3c: Summary of Potential Impacts of Comprehensive Project during Decommissioning of the Proposed Action

Section	Topic	Description of Impact[(a)]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(b)]	Significant Unavoidable Adverse Impacts[(c)]
Wildlife and Habitat (Section 4.6)	Special status species: ferruginous hawk	Decommissioning may result in mortality from machinery operation over the Lease Boundary.	Negligible	Short Term	Feasible	Confined	**Wild-1**: Review 2-year raptor and bat monitoring program. **Wild-4**: Avoid use of pesticides and rodenticides. **Wild-5:** Limit disturbance by identifying sensitive areas. **Wild-6**: Maintain database of road mortalities. **Wild-8**: Establish buffers around raptor nests. **Hab-4:** Develop TAC. **Hab-7:** Roadway decommissioning. **Veg-7:** Detailed Site Restoration Plan. **Spec-5**: Ferruginous hawk–specific mitigation	None identified
Wildlife and Habitat (Section 4.6)	Special status species: golden eagle	Decommissioning of the Project could disturb golden eagles, resulting in avoidance of the Project site, though golden eagle nesting has not been reported within 10 miles of the Lease Boundary.	Negligible	Short Term	Unlikely	Confined	**Wild-2**: Use wildlife-proof trash containers. **Wild-3**: Review USFWS eagle mortality consultation. **Wild-4**: Avoid use of pesticides and rodenticides. **Wild-5:** Limit construction disturbance by identifying sensitive areas. **Veg-1:** Tree Avoidance. **Hab-4:** Develop TAC. **Spec-3:** Implement eagle-specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: great blue heron and sandhill crane	Decommissioning activities may disturb birds flying over the Lease Boundary, resulting in bird flight paths being diverted around the area.	Negligible	Short Term	Feasible	Confined	**Wild-1**: Review 2-year raptor and bat monitoring program. **Wild-4**: Avoid use of pesticides and rodenticides. **Wild-5:** Limit disturbance by identifying sensitive areas. **Hab-4:** Develop TAC. **Spec-6**: Implement great blue heron, sandhill crane, and tundra swan–specific mitigation.	None identified

Table ES-3c: Summary of Potential Impacts of Comprehensive Project during Decommissioning of the Proposed Action

Section	Topic	Description of Impact[(a)]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(b)]	Significant Unavoidable Adverse Impacts[(c)]
Wildlife and Habitat (Section 4.6)	Special status species: loggerhead shrike \	Decommissioning may disturb birds foraging and nesting in the Lease Boundary. Machinery could result in mortality of birds and destruction of nests.	Negligible	Short Term	Feasible	Confined	**Wild-4**: Avoid use of pesticides and rodenticides. **Wild-5:** Limit disturbance by identifying sensitive areas. **Wild-6**: Maintain database of road mortalities. **Wild-7:** schedule activities to daylight hours. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-7:** Roadway decommissioning. **Veg-7:** Detailed Site Restoration Plan. **Spec-7:** Implement loggerhead shrike, sagebrush sparrow, sage thrasher, and Vaux's swift–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: prairie falcon	Disturbance from decommissioning activities may result in disturbance to prairie falcons.	Negligible	Short Term	Unlikely	Confined	**Wild-4**: Avoid use of pesticides and rodenticides. **Wild-5:** Limit disturbance by identifying sensitive areas. **Wild-6**: Maintain database of road mortalities. **Wild-8**: Establish buffers around raptor nests. **Veg-1:** Tree Avoidance. **Hab-4:** Develop TAC. **Hab-7:** Roadway decommissioning. **Veg-7:** Detailed Site Restoration Plan. **Spec-8**: Implement prairie falcon–specific mitigation.	None identified

Table ES-3c: Summary of Potential Impacts of Comprehensive Project during Decommissioning of the Proposed Action

Section	Topic	Description of Impact[(a)]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(b)]	Significant Unavoidable Adverse Impacts[(c)]
Wildlife and Habitat (Section 4.6)	Special status species: ring-necked pheasant	Disturbance from decommissioning activities may result in indirect habitat loss. Access roads may result in collisions with ring-necked pheasants.	Negligible	Short Term	Feasible	Confined	**Wild-5:** Limit disturbance by identifying sensitive areas. **Wild-6**: Maintain database of road mortalities. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-7:** Roadway decommissioning **Veg-7:** Detailed Site Restoration Plan. **Spec-9**: Implement ring-necked pheasant–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: sagebrush sparrow and sage thrasher	Decommissioning may disturb birds foraging and nesting in the Lease Boundary. Machinery could result in mortality of birds and destruction of nests.	Negligible	Short Term	Feasible	Confined	**Wild-4**: Avoid use of pesticides and rodenticides. **Wild-5:** Limit disturbance by identifying sensitive areas. **Wild-6**: Maintain database of road mortalities. **Wild-7:** Schedule activities to daylight hours. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-7:** Roadway decommissioning. **Veg-7:** Detailed Site Restoration Plan. **Spec-7:** Implement loggerhead shrike, sagebrush sparrow, sage thrasher, and Vaux's swift–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: tundra swan	Decommissioning may disturb tundra swans flying over and foraging in the Lease Boundary.	Negligible	Short Term	Feasible	Confined	**Wild-1**: Review 2-year raptor and bat monitoring program. **Wild-4**: Avoid use of pesticides and rodenticides. **Wild-5:** Limit disturbance by identifying sensitive areas. **Hab-4:** Develop TAC. **Spec-6**: Implement great blue heron, sandhill crane, and tundra swan–specific mitigation.	None identified

Table ES-3c: Summary of Potential Impacts of Comprehensive Project during Decommissioning of the Proposed Action

Section	Topic	Description of Impact[(a)]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(b)]	Significant Unavoidable Adverse Impacts[(c)]
Wildlife and Habitat (Section 4.6)	Special status species: Vaux's swift	Decommissioning of the Project could disturb Vaux's swifts in flight over the Lease Boundary.	Negligible	Short Term	Unlikely	Confined	**Wild-4**: Avoid use of pesticides and rodenticides. **Hab-4:** Develop TAC. **Spec-7:** Implement loggerhead shrike, sagebrush sparrow, sage thrasher, and Vaux's swift–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: black-tailed jackrabbit and white-tailed jackrabbit	Disturbance from decommissioning activities may result in indirect habitat loss. Access roads may result in collisions with jackrabbits.	Negligible	Short Term	Feasible	Confined	**Wild-4**: Avoid use of pesticides and rodenticides. **Wild-5:** Limit disturbance by identifying sensitive areas **Wild-6**: Maintain database of road mortalities. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-7:** Roadway decommissioning **Veg-7:** Detailed Site Restoration Plan. **Spec-10:** Implement black and white-tailed jackrabbit–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: Townsend's big-eared bat	Decommissioning activities could disturb Townsend's big-eared bat foraging in the Lease Boundary.	Negligible	Short Term	Unlikely	Confined	**Wild-4**: Avoid use of pesticides and rodenticides. **Wild-7:** Schedule construction during daylight hours. **Hab-4:** Develop TAC. **Spec-11:** Implement Townsend's big-eared bat–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: Townsend's ground squirrel	Mortality may occur during decommissioning and along access roads.	Negligible	Short Term	Feasible	Confined	**Wild-4**: Avoid use of pesticides and rodenticides. **Wild-5:** Limit disturbance by identifying sensitive areas. **Wild-6**: Maintain database of road mortalities. **Hab-4:** Develop TAC. **Hab-7:** Roadway decommissioning. **Veg-7:** Detailed Site Restoration Plan. **Spec-12:** Implement Townsend's ground squirrel–specific mitigation.	None identified

Table ES-3c: Summary of Potential Impacts of Comprehensive Project during Decommissioning of the Proposed Action

Section	Topic	Description of Impact[(a)]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(b)]	Significant Unavoidable Adverse Impacts[(c)]
Wildlife and Habitat (Section 4.6)	Special status species: pronghorn antelope	Decommissioning is predicted to result in indirect habitat loss. Increased traffic on existing and new access roads may result in pronghorn antelope mortality.	Negligible	Short Term	Feasible	Confined	**Wild-5:** Limit disturbance by identifying sensitive areas. **Wild-6**: Maintain database of road mortalities. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-7:** Roadway decommissioning. **Veg-7:** Detailed Site Restoration Plan. **Spec-13:** Implement pronghorn antelope–specific mitigation.	None identified
Energy (Section 4.7)	Consumption of Raw Materials and Commodities	Energy consumption, predominantly in the form of gasoline, diesel fuel, and electricity, would be required to operate equipment such as cranes, trucks, tools, and vehicles used to dismantle and remove most Project facilities and reclaim disturbed areas. Backfilling void spaces created by the removal of foundations would require construction aggregate.	Low	Temporary to Short Term	Unavoidable	Local	**ENR-6:** Demolition or removal of all Project related equipment and facilities. **ENR-7:** Recycle all components of the Project.	None identified
Land and Shoreline Use (Section 4.8)	Agriculture	Impacts would be less than those described for the construction stage as dryland wheat production located within the solar array project area would have previously been taken out of management.	Low	Temporary (brief access modifications) Short Term (seasonal restrictions)	Unavoidable	Limited (small area) Regional (decreased productivity)	**LSU-1:** The Applicant would prepare a livestock management plan. **LSU-2:** The Applicant would prepare a dryland farming management plan. **LSU-3:** Arrange for the removal of livestock. **LSU-4**: Confirm that site restoration activities are in alignment with the Applicant's decommissioning plan. **LSU-5:** Requirements for requesting an alternative land use as part of decommissioning.	None identified
Historic and Cultural Resources (Section 4.9)	Eligible Architectural Resources	Impacts on environmental setting—visual, air quality and noise.	High	Short Term	Probable	Local	**CR-2:** Archaeological and Architectural Resources Mitigation	None identified
Historic and Cultural Resources (Section 4.9)	Traditional Cultural Properties	Impacts on environmental setting – visual, air quality, noise, and loss of access.	High	Short Term	Probable	Regional	**CR-1:** Traditional Cultural Properties Mitigation	None identified

Table ES-3c: Summary of Potential Impacts of Comprehensive Project during Decommissioning of the Proposed Action

Section	Topic	Description of Impact[(a)]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(b)]	Significant Unavoidable Adverse Impacts[(c)]
Historic and Cultural Resources (Section 4.9)	Unknown/ Unidentified Historic and Cultural Resources	Impacts potentially resulting in the partial or complete loss of significant (previously unidentified) resources.	High	Constant	Unlikely	Local	**CR-2:** Archaeological and Architectural Resources Mitigation	None identified
Visual Aspects, Light and Glare (Section 4.10)	Visual Aspect	Activities would attract attention and would modify the existing landscape setting. Due to the additive effect of the different Project features, these impacts would affect a larger area.	Low	Temporary (brief access modifications) Short Term (seasonal restrictions)	Unavoidable	Limited (small area) Regional (decreased productivity)	No mitigation identified	None identified
Visual Aspects, Light and Glare (Section 4.10)	Light	Activities would be completed mainly during daytime hours without the need for nighttime lighting.	Negligible	Temporary	Unlikely	Limited	No mitigation identified	None identified
Visual Aspects, Light and Glare (Section 4.10)	Glare	Activities could generate glare from construction equipment or solar panels.	Low	Temporary	Feasible	Confined	No mitigation identified	None identified
Noise and Vibration (Section 4.11)	Noise and Vibration – Decommissioning Equipment	Most noise sensitive receptors would receive sound levels below 55 dBA during construction, with the potential to be up to 10 dBA over baseline. One noise sensitive receptor could receive sound levels at 55 dBA during construction of one turbine.	Medium	Temporary	Probable	Limited	**N1:** Avoid laydown and equipment storage/parking areas near NSRs. **N2:** Limit the use of noise-generating equipment to daytime hours (7 a.m. to 10 p.m.) and loud equipment to working hours (7 a.m. to 6 p.m.). **N-3:** Monitor noise during nighttime operations (10 p.m. to 7 a.m.) with the potential to impact NSRs. **N-4:** Set up a 24-hour "noise hot line" or similar and update the Applicant's noise complaint resolution procedure to include contacting and reporting details.	None identified
Recreation (Section 4.12)	Recreation – Use	Decommissioning of the comprehensive Project would result in a high impact due to the restriction of access to public land and recreational activities that occur on public land near the Project. The impact would be short term for the duration of decommissioning, unavoidable, and local.	High	Short Term	Unavoidable	Local	**R-1:** Work with DNR and Benton County to identify new recreational activities and/or improve existing recreational activities within Lease Boundary (e.g., multi-use trails). **R-2:** Provide informational boards, as approved by DNR and EFSEC, at viewpoints associated with scenic areas of interest. **R-3:** Work with the local and regional clubs to provide and maintain a plan to keep recreationists safe.	None identified

Table ES-3c: Summary of Potential Impacts of Comprehensive Project during Decommissioning of the Proposed Action

Section	Topic	Description of Impact[a]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[b]	Significant Unavoidable Adverse Impacts[c]
Recreation (Section 4.12)	Recreation – Recreational Experience	Indirect impacts related to visual resources and noise could occur at recreation sites. Impacts on noise receptors would occur locally, while visual impacts would occur at a regional spatial extent.	High	Short Term	Unavoidable	Regional	**R-2:** Provide informational boards, as approved by DNR and EFSEC, at viewpoints associated with scenic areas of interest.	None identified
Recreation (Section 4.12)	Recreation – Public Health and Safety	The Project's potential to affect the health and safety of recreationists using the area for paragliding, hang gliding, or biking would result in a medium impact.	Medium	Short Term	Unavoidable	Regional	**R-3:** Work with the local and regional clubs to provide and maintain a plan to keep recreationists safe	None identified
Public Health and Safety (Section 4.13)	Fire (Worker Health and Safety)	Combustible materials and lubricants are contained in the nacelle of the turbines. Diesel-powered generators may be used during decommissioning. Use of these materials could pose a fire risk.	Medium	Temporary	Feasible	Limited	No mitigation identified	None identified
Public Health and Safety (Section 4.13)	Smoke and Haze (Public Health)	If a fire were to occur during turbine decommissioning, indirect impacts could include smoke or haze, and a potential reduction in emergency response services.	Medium	Temporary	Feasible	Regional	No mitigation identified	None identified
Public Health and Safety (Section 4.13)	Release of Hazardous Materials	Project elements include small amounts of oil, which could be released during decommissioning.	Medium	Temporary	Unlikely	Limited	No mitigation identified	None identified
Transportation (Section 4.14)	Vehicular Traffic	Decommissioning will require the removal and transportation of the dismantled pieces of the turbines, expected to be smaller than the pieces that arrived during the construction stage. The increase in traffic volumes is not expected to decrease level of service or cause a decline in roadway safety.	Low	Short Term	Unavoidable	Regional	**TR-1:** Daily transport communication, including emergency numbers. **TR-2:** Operation Lifesaver safety presentation and training. **TR-3:** Traffic Analysis. **TR-4:** Railroad crossing and grade change survey. **TR-5:** Traffic and Safety Management Plan.	None identified
Public Services and Utilities (Section 4.15)	Wastewater	The amount of wastewater produced from the temporary workers on site, while measurable, would not impact the ability of the local utility to treat the community's sewage.	Low	Short Term	Unavoidable	Local	No mitigation identified	None identified

Table ES-3c: Summary of Potential Impacts of Comprehensive Project during Decommissioning of the Proposed Action

Section	Topic	Description of Impact[a]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[b]	Significant Unavoidable Adverse Impacts[c]
Public Services and Utilities (Section 4.15)	Municipal Solid Waste	After dismantling of the facility, high-value components would be removed for scrap value. The remaining materials would be reduced to transportable size and removed from the site for disposal. Existing facilities would maintain capacity to receive the Project's non-recyclable waste and continue to serve their communities.	Low	Constant	Unavoidable	Local to Regional	**ENR-7**: Recycle all applicable components. **PSU-1**: Use of a licensed waste disposal facility.	None identified
Socioeconomics (Section 4.16)	Housing Availability	The majority of construction workers would be sourced locally; however, the Project's construction would require temporary and short-term relocation of construction workers into the region.	Negligible	Temporary to Short Term	Feasible	Regional	**Socio-ec-1:** Updated housing analysis to confirm temporary or short-term availability.	None identified
Socioeconomics (Section 4.16)	Wellbeing	Decommissioning of the Project would restore property tax revenues for Benton County and the Tax Area to pre-Project conditions as the Project's added value would be removed from the parcels that make up the Lease Boundary's valuation. For example, smaller collections would impact operational budgets for schools, school districts, and fire stations within Benton County and the Tax Area.	Medium	Long Term	Feasible	Regional	No mitigation identified	None identified
Socioeconomics (Section 4.16)	People of color and Low-Income Populations	Disproportionate impacts on people of color and low income communities.	Negligible	Temporary to Long Term	Unlikely	Regional	No mitigation identified	None identified

Notes:
(a) Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.
(b) Mitigation measures listed here are additional actions that EFSEC could impose to further reduce the impacts. See Section 4.1 for details.
(c) Significant unavoidable impacts are those that would remain even after all identified additional mitigation measures have been required by EFSEC.
EFSEC = Energy Facility Site Evaluation Council; mph = miles per hour; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than 10 microns in diameter

Table ES-4a

Summary of Potential Impacts by Component during Construction of the Proposed Action

This Page Intentionally Left Blank

Table ES-4a: Summary of Potential Impacts by Component during Construction of the Proposed Action

Section	Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Earth Resources (Section 4.2)	Soils	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	The disturbance to natural soil profiles could result in a temporary increase in localized soil erosion. These activities are likely to include site clearing, excavation, and backfilling. The construction and erection of turbine tower foundations would disturb soil resources as the contractor excavates unsuitable material from the Project area.	Low	Short Term	Unavoidable	Confined	**Geo-1:** Avoid construction during wet periods. **Veg-7:** Detailed Site Restoration Plan.	None identified
Earth Resources (Section 4.2)	Topography	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Construction activities that would impact topography include excavation, grading, and cut-and-fill-slope development. Limited grading and/or placement of additional fill may be needed to obtain necessary grades for access roads, building foundations, and leveling the ground. Surface disturbance from construction-related activities would impact topography around each turbine.	Low	Short Term	Unavoidable	Confined	**Geo-1:** Avoid construction during wet periods.	None identified
Earth Resources (Section 4.2)	Earthquakes	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Prolonged earthquake-induced ground shaking could cause minor damage to infrastructure if shaking has an intensity and duration that exceeds code-based structural seismic design levels.	Negligible	Temporary	Feasible	Confined	**Geo-1:** Avoid construction during wet periods.	None identified
Earth Resources (Section 4.2)	Landslide Hazards and Ground Instability	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	The Project site includes areas susceptible to landslides and bluff failures. Existing ground instability, high rainfall rates, and strong earthquake shaking could cause landslides.	Low	Temporary	Unlikely	Limited	**Geo-1:** Avoid construction during wet periods. **Veg-7:** Detailed Site Restoration Plan.	None identified

Notes:
Table continues below, notes apply to remainder of table
[a] Components were combined in the same cell if they received the same impact ratings for the identified topic.
[b] Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.
[c] Mitigation measures listed here are additional actions that EFSEC could impose to further reduce the impacts. See Section 4.1 for details.
[d] Significant unavoidable impacts are those that would remain even after all identified additional mitigation measures have been required by EFSEC.
Applicant = Horse Heaven Wind Farm, LLC; ASC = Application for Site Certification; BESS = battery energy storage system; BMP = best management practice; DNR = Washington State Department of Natural Resources; EFSEC = Washington Energy Facility Site Evaluation Council; EIS = Environmental Impact Statement; NRHP = National Register of Historic Places; SWPPP = stormwater pollution prevention plan; TAC = Technical Advisory Committee; Tribes = Yakama Nation, the Confederated Tribes of the Umatilla Indian Reservation, the Nez Perce Tribe, and the Wanapum Tribe; USFWS = U.S. Fish and Wildlife Service; WDFW = Washington Department of Fish and Wildlife; ZOI = zone of influence

Table ES-4a: Summary of Potential Impacts by Component during Construction of the Proposed Action

Section	Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Earth Resources (Section 4.2)	Volcanic Activity	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Hazards from ashfall to construction activities would include the following: ▪ Accumulation of ash on structures ▪ Clogging of electronics, machinery, and filters ▪ Suspension of abrasive fine particles in air and water ▪ Accumulation of ash on transportation routes and vegetation	Negligible	Temporary	Unlikely	Confined	**Geo-1:** Avoid construction during wet periods. **Veg-7:** Detailed Site Restoration Plan.	None identified
Water Resources (Section 4.4)	Physical Disturbance	Turbine Option 1 Turbine Option 2	Project construction would require temporary and permanent disturbance, which could impact surface water and wetlands, surface runoff/absorption, floodplains, and groundwater.	Low	Short Term (for temporary disturbance) Long Term (for permanent disturbance)	Unavoidable	Confined	**W-1:** Least Risk Fish Windows. **W-2:** Minimize Work in Heavy Rain. **W-3:** Check Dams. **W-4:** Culvert Installation. BMPs. **W-6:** Wetland SWPPP. **W-7:** Clear-span 100-Year Floodplain.	None identified
Water Resources (Section 4.4)	Physical Disturbance	Solar Arrays	Project construction would require temporary and permanent disturbance, which could impact surface water and wetlands, surface runoff/absorption, floodplains, and groundwater.	Low	Short Term	Unavoidable	Confined	**W-1:** Least Risk Fish Windows. **W-2:** Minimize Work in Heavy Rain. **W-3:** Check Dams. **W-4:** Culvert Installation BMPs. **W-6:** Wetland SWPPP. **W-7:** Clear-span 100-Year Floodplain.	None identified
Water Resources (Section 4.4)	Physical Disturbance	BESSs Substations	Project construction would require temporary and permanent disturbance, which could impact surface water and wetlands, surface runoff/absorption, floodplains, and groundwater.	Low	Short Term (for temporary disturbance) Long Term (for permanent disturbance)	Unavoidable	Limited	**W-1:** Least Risk Fish Windows. **W-2:** Minimize Work in Heavy Rain. **W-3:** Check Dams. **W-6:** Wetland SWPPP.	None identified
Water Resources (Section 4.4)	Change in Water Quality	Turbine Option 1 Turbine Option 2	Project construction could result in a change to water quality of waterways that intersect or are located adjacent to Project construction activities.	Low	Temporary	Unlikely	Local	**W-1:** Least Risk Fish Windows. **W-2:** Minimize Work in Heavy Rain. **W-3:** Check Dams. **W-5** Employee Training. **W-6:** Wetland SWPPP. **W-8:** Spill Response Equipment.	None identified

Table ES-4a: Summary of Potential Impacts by Component during Construction of the Proposed Action

Section	Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Water Resources (Section 4.4)	Change in Water Quality	Solar Arrays	Project construction could result in a change to water quality of waterways adjacent to Project construction activities.	Negligible	Temporary	Unlikely	Local	**W-1:** Least Risk Fish Windows. **W-2:** Minimize Work in Heavy Rain. **W-3:** Check Dams. **W-5:** Employee Training. **W-6:** Wetland SWPPP. **W-8:** Spill Response Equipment.	None identified
Water Resources (Section 4.4)	Change in Hydrology – Temporary Disturbance	Turbine Option 1 Turbine Option 2	Temporary disturbance from Project construction within ephemeral and intermittent streams could result in changes to the hydrology of waterways.	Low	Short Term	Unlikely	Limited	**W-1:** Least Risk Fish Windows. **W-2:** Minimize Work in Heavy Rain. **W-3:** Check Dams. **W-4:** Culvert Installation BMPs.	None identified
Water Resources (Section 4.4)	Change in Hydrology – Permanent Disturbance	Turbine Option 1 Turbine Option 2	Project construction would require a culvert installation on one intermittent stream that could result in changes to the hydrology of the stream.	Low	Long Term	Unavoidable	Limited	**W-1:** Least Risk Fish Windows. **W-2:** Minimize Work in Heavy Rain. **W-3:** Check Dams. **W-4:** Culvert Installation BMPs.	None identified
Water Resources (Section 4.4)	Introduction of Hazardous Substances	Turbine Option 1 Turbine Option 2	Project construction could result in the introduction of hazardous substances that could impact surface water and wetlands, floodplains, and groundwater.	Low	Temporary	Unlikely	Local	**W-7:** Employee Training. **W-8:** Spill Response Equipment.	None identified
Water Resources (Section 4.4)	Introduction of Hazardous Substances	Solar Arrays BESSs Substations	Project construction could result in the introduction of hazardous substances that could impact surface water and wetlands, floodplains, and groundwater.	Negligible	Temporary	Unlikely	Limited	**W-3:** Concrete Wash-out Area. **W-5:** Employee Training **W-8:** Spill Response Equipment.	None identified
Water Resources (Section 4.4)	Public Water Supply	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Project construction activities would rely on water supplied by the City of Kennewick Public Works.	Low	Temporary	Feasible	Regional	**W-9:** Minimize Water Use.	None identified
Vegetation (Section 4.5)[27]	Loss of Extent of Priority Habitat – Temporary Disturbance	Turbine Option 1 Turbine Option 2	Site clearing associated with temporary disturbance would result in direct loss of acreage associated with WDFW Priority Habitat.	High	Short Term	Unavoidable	Limited	**Veg-1:** Tree Avoidance. **Veg-4:** As-Built Report and Offset Calculation.	None identified

[27] Blue highlight identifies Impacts of Medium and High magnitude.

Table ES-4a: Summary of Potential Impacts by Component during Construction of the Proposed Action

Section	Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Vegetation (Section 4.5)	Loss of Extent of Priority Habitat – Temporary Disturbance	East Solar Field	Site clearing associated with temporary disturbance would result in direct loss of acreage associated with WDFW Priority Habitat.	Medium	Short Term	Unavoidable	Limited	**Veg-1:** Tree Avoidance. **Veg-4:** As-Built Report and Offset Calculation.	None identified
Vegetation (Section 4.5)	Loss of Extent of Priority Habitat – Temporary Disturbance	Sellards Solar Field	Site clearing associated with temporary disturbance would result in direct loss of acreage associated with WDFW Priority Habitat.	Low	Short Term	Feasible	Limited	**Veg-1:** Tree Avoidance. **Veg-4:** As-Built Report and Offset Calculation.	None identified
Vegetation (Section 4.5)	Loss of Extent of Priority Habitat – Temporary Disturbance	County Well Solar Field BESSs Substations	Site clearing associated with temporary disturbance would result in direct loss of acreage associated with WDFW Priority Habitat.	Negligible	Short Term	Unlikely	Limited	**Veg-1:** Tree Avoidance. **Veg-4:** As-Built Report and Offset Calculation.	None identified
Vegetation (Section 4.5)	Loss of Extent of Priority Habitat -Permanent Disturbance	Turbine Option 1 Turbine Option 2	Site clearing associated with permanent disturbance would result in direct loss of acreage associated with WDFW Priority Habitat.	Low	Long Term	Unavoidable	Limited	**Veg-1:** Tree Avoidance. **Veg-4:** As-Built Report and Offset Calculation.	None identified
Vegetation (Section 4.5)	Loss of Extent of Priority Habitat -Permanent Disturbance	East Solar Field	Site clearing associated with permanent disturbance would result in direct loss of acreage associated with WDFW Priority Habitat.	High	Long Term	Unavoidable	Limited	**Veg-1:** Tree Avoidance. **Veg-4:** As-Built Report and Offset Calculation.	None identified
Vegetation (Section 4.5)	Loss of Extent of Priority Habitat –Permanent Disturbance	County Well Solar Field Sellards Solar Field BESSs Substations	Site clearing associated with permanent disturbance would result in direct loss of acreage associated with WDFW Priority Habitat.	Negligible	Long Term	Unlikely	Limited	**Veg-1:** Tree Avoidance. **Veg-4:** As-Built Report and Offset Calculation.	None identified
Vegetation (Section 4.5)	Loss of Extent Other Habitat – Temporary Disturbance	Turbine Option 1 Turbine Option 2	Site clearing associated with temporary disturbance would result in direct loss of acreage associated with other habitat.	Low	Short Term	Unavoidable	Confined	**Veg-1:** Tree Avoidance. **Veg-4:** As-Built Report and Offset Calculation.	None identified
Vegetation (Section 4.5)	Loss of Extent Other Habitat – Temporary Disturbance	Solar Arrays BESSs Substations	Site clearing associated with temporary disturbance would result in direct loss of acreage associated with other habitat.	Negligible	Short Term	Unavoidable	Limited	**Veg-1:** Tree Avoidance. **Veg-4:** As-Built Report and Offset Calculation.	None identified
Vegetation (Section 4.5)	Loss of Extent of Other Habitat – Permanent Disturbance	East Solar Field	Site clearing associated with permanent disturbance would result in direct loss of acreage associated with other habitat.	Low	Long Term	Unavoidable	Confined	**Veg-1:** Tree Avoidance. **Veg-4:** As-Built Report and Offset Calculation.	None identified

Table ES-4a: Summary of Potential Impacts by Component during Construction of the Proposed Action

Section	Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Vegetation (Section 4.5)	Loss of Extent of Other Habitat – Permanent Disturbance	Turbine Option 1 Turbine Option 2 County Well Solar Field Sellards Solar Field BESSs Substations	Site clearing associated with permanent disturbance would result in direct loss of acreage associated with other habitat.	Negligible	Long Term	Unavoidable	Limited	**Veg-1:** Tree Avoidance **Veg-4:** As-Built Report and Offset Calculation.	None identified
Vegetation (Section 4.5)	Loss of Extent of Special Status Plant Species	Turbine Option 1 Turbine Option 2	Site clearing associated with the construction of the Project would result in direct loss of populations of special status plant species or their habitat.	Medium	Constant	Feasible	Local	**Veg-2:** Pre-Disturbance Surveys for Special Status Plant Species. **Veg-3:** Special Status Plant Species Education. **Veg-4:** As-Built Report and Offset Calculation.	None identified
Vegetation (Section 4.5)	Loss of Extent of Special Status Plant Species	East Solar Field	Site clearing associated with the construction of the Project would result in direct loss of populations of special status plant species or their habitat.	Medium	Constant	Unlikely	Local	**Veg-2:** Pre-Disturbance Surveys for Special Status Plant Species. **Veg-3:** Special Status Plant Species Education. **Veg-4:** As-Built Report and Offset Calculation.	None identified
Vegetation (Section 4.5)	Loss of Extent of Special Status Plant Species	Sellards Solar Field	Site clearing associated with construction of the Project would result in direct loss of populations of special status plant species or their habitat.	Low	Constant	Unlikely	Local	**Veg-2:** Pre-Disturbance Surveys for Special Status Plant Species. **Veg-3:** Special Status Plant Species Education. **Veg-4:** As-Built Report and Offset Calculation.	None identified
Vegetation (Section 4.5)	Loss of Extent of Special Status Plant Species	County Well Solar Field BESSs Substations	Site clearing associated with construction of the Project would result in direct loss of populations of special status plant species or their habitat.	Negligible	Constant	Unlikely	Local	**Veg-2:** Pre-Disturbance Surveys for Special Status Plant Species. **Veg-3:** Special Status Plant Species Education. **Veg-4:** As-Built Report and Offset Calculation.	None identified
Wildlife and Habitat (Section 4.6)	Habitat Loss	Turbine Option 1 Turbine Option 2	The Project would result in the direct loss of habitat through construction of the Wind Energy Micrositing Corridor and associated transportation routes. The Project may also result in indirect habitat loss through increased noise, light, and human presence during construction.	Medium	Short Term for temporary disturbances (e.g., construction laydown areas) Constant for permanent footprint loss (e.g., turbine footprint)	Unavoidable	Local	**Wild-5:** Limit construction disturbance by identifying sensitive areas. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-3:** Temporary laydown areas. **Hab-4:** Develop TAC. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-1:** Tree Avoidance.	None identified

Table ES-4a: Summary of Potential Impacts by Component during Construction of the Proposed Action

Section	Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Wildlife and Habitat (Section 4.6)	Habitat Loss	Solar Arrays	The Project would result in the direct loss of habitat, including modified habitat, through construction of the solar arrays and associated transportation routes. The Project may also result in indirect habitat loss through increased noise, light, and human presence during construction.	Medium	Short Term for temporary disturbances (e.g., construction laydown areas) and modified habitat under the solar fields. Constant for permanent footprint loss.	Unavoidable	Confined	**Wild-5:** Limit construction disturbance by identifying sensitive areas. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-3:** Temporary laydown areas **Hab-4:** Develop TAC. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-1:** Tree Avoidance.	None identified
Wildlife and Habitat (Section 4.6)	Habitat Loss	BESSs Substations	The Project would result in the direct loss of habitat through construction of the BESSs, substations, and associated transportation routes. The Project may also result in indirect habitat loss through increased noise, light, and human presence during construction.	Low	Short Term for temporary disturbances (e.g., construction laydown areas) Long Term for permanent footprint loss.	Unavoidable	Limited	**Wild-5:** Limit construction disturbance by identifying sensitive areas. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-3:** Temporary laydown areas. **Hab-4:** Develop TAC. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-1:** Tree Avoidance.	None identified

Table ES-4a: Summary of Potential Impacts by Component during Construction of the Proposed Action

Section	Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Wildlife and Habitat (Section 4.6)	Mortality of non-special status species	Turbine Option 1 Turbine Option 2	The Project may result in mortality of smaller animals (e.g., birds, herptiles, small mammals) during clearing and ground preparation works. Wildlife-vehicle collisions may occur during Project construction due to increased traffic.	Low	Short Term	Feasible	Confined	**Wild-1:** Review 2-year raptor and bat monitoring program. **Wild-2:** Use wildlife-proof trash containers. **Wild-3:** Review USFWS eagle mortality consultation. **Wild-4:** Avoid use of pesticides and rodenticides. **Wild-5:** Limit construction disturbance by identifying sensitive areas. **Wild-6:** Maintain database of road mortalities. **Wild-7:** schedule construction during daylight hours. **Wild-8:** Establish buffers around raptor nests. **Wild-9:** Time vegetation clearing outside of nesting season and provide mitigation for nesting birds. **Hab-4:** Develop TAC. **Hab-6:** Work with EFSEC on final Project layout and design.	None identified

Table ES-4a: Summary of Potential Impacts by Component during Construction of the Proposed Action

Section	Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Wildlife and Habitat (Section 4.6)	Mortality of non-special status species	Solar Arrays	The Project may result in mortality of smaller animals (e.g., birds, herptiles, small mammals) during clearing and ground preparation works. Wildlife-vehicle collisions may occur during Project construction due to increased traffic.	Low	Short Term	Feasible	Limited	**Wild-1:** Review 2-year raptor and bat monitoring program. **Wild-2:** Use wildlife-proof trash containers. **Wild-3:** Review USFWS eagle mortality consultation. **Wild-4:** Avoid use of pesticides and rodenticides. **Wild-5:** Limit construction disturbance by identifying sensitive areas. **Wild-6:** Maintain database of road mortalities. **Wild-7:** Schedule construction during daylight hours. **Wild-8:** Establish buffers around raptor nests. **Wild-9:** Time vegetation clearing to avoid nesting season and mitigation of nesting birds. **Hab-4:** Develop TAC.	None identified
Wildlife and Habitat (Section 4.6)	Mortality of non-special status species	BESSs Substations	The Project may result in mortality of smaller animals (e.g., birds, herptiles, small mammals) during clearing and ground preparation works. Wildlife-vehicle collisions may occur during Project construction due to increased traffic.	Negligible	Short Term	Feasible	Limited	**Wild-1:** Review 2-year raptor and bat monitoring program. **Wild-2:** Use wildlife-proof trash containers. **Wild-3:** Review USFWS eagle mortality consultation. **Wild-4:** Avoid use of pesticides and rodenticides. **Wild-5:** Limit construction disturbance by identifying sensitive areas. **Wild-6:** Maintain database of road mortalities. **Wild-7:** Schedule construction during daylight hours. **Wild-8:** Establish buffers around raptor nests. **Wild-9:** Time vegetation clearing outside of nesting season and provide mitigation for nesting birds. **Hab-4:** Develop TAC.	None identified

Table ES-4a: Summary of Potential Impacts by Component during Construction of the Proposed Action

Section	Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Wildlife and Habitat (Section 4.6)	Barriers to movement and fragmentation	Turbine Option 1 Turbine Option 2	Turbines, power lines, roadways, and other linear infrastructure could create barriers to wildlife movement and fragment habitat. Barriers and fragmentation created during construction would predominantly remain through operation.	Low	Long Term	Probable	Confined	**Wild-5:** Limit activity disturbance by identifying sensitive areas. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-3:** Temporary laydown areas. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design.	None identified
Wildlife and Habitat (Section 4.6)	Barriers to movement and fragmentation	Solar Arrays	Solar arrays may impact wildlife movement and fragment habitat by bisecting movement corridors. Solar arrays would be fenced, which is expected to create a barrier to movement of larger wildlife around the arrays.	Low	Long Term	Unavoidable	Confined	**Wild-5:** Limit activity disturbance by identifying sensitive areas. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-3:** Temporary laydown areas. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design.	None identified
Wildlife and Habitat (Section 4.6)	Barriers to movement and fragmentation	BESSs Substations	BESSs and substations may create barriers to wildlife movement in the adjacent area.	Negligible	Long Term	Unavoidable	Limited	**Wild-5:** Limit activity disturbance by identifying sensitive areas. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-3:** Temporary laydown areas **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: striped whipsnake and sagebrush lizard	Turbine Option 1 Turbine Option 2 Solar Array BESSs Substations	Impacts on shrub and shrub-steppe habitat may result in loss of suitable reptile habitat. Mortality of reptile species could occur during construction from heavy machinery and land clearing and grubbing.	Low	Constant	Feasible	Confined	**Wild-5:** Limit construction disturbance by identifying sensitive areas. **Wild-6:** Maintain database of road mortalities. **Hab-3:** Temporary laydown areas **Hab-4:** Develop TAC. **Hab-6:** Work with EFSEC on final Project layout and design. **Spec-1:** Implement striped whipsnake and sagebrush lizard–specific mitigation.	None identified

Table ES-4a: Summary of Potential Impacts by Component during Construction of the Proposed Action

Section	Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Wildlife and Habitat (Section 4.6)	Special status species: American white pelican	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Construction of the Project may disturb American white pelicans moving over the Lease Boundary.	Negligible	Short Term	Unlikely	Limited	**Hab-3:** Temporary laydown areas **Hab-4:** Develop TAC. **Hab-6:** Work with EFSEC on final Project layout and design. **Spec-2:** Implement American white pelican–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: bald eagle	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Construction of the Project could disturb bald eagles, resulting in avoidance of the Project Site.	Negligible	Short Term	Feasible	Confined	**Wild-1:** Review 2-year raptor and bat monitoring program. **Wild-2:** Use wildlife-proof trash containers. **Wild-3:** Review USFWS eagle mortality consultation. **Wild-4:** Avoid use of pesticides and rodenticides. **Wild-5:** Limit construction. disturbance by identifying sensitive areas. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-1:** Tree Avoidance. **Spec-3:** Implement eagle-specific mitigation.	None identified

Table ES-4a: Summary of Potential Impacts by Component during Construction of the Proposed Action

Section	Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Wildlife and Habitat (Section 4.6)	Special status species: burrowing owl	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Construction may result in direct and indirect habitat loss and the destruction of burrows (active, inactive, and potential). Mortality may occur during vegetation and ground-disturbing works.	Medium	Short Term (disturbance, mortality) Constant (habitat loss)	Feasible (mortality) Probable (disturbance) Unavoidable (Habitat loss)	Confined	**Wild-1:** Review 2-year raptor and bat monitoring program. **Wild-4:** Avoid use of pesticides and rodenticides. **Wild-5:** Limit construction disturbance by identifying sensitive areas. **Wild-6:** Maintain database of road mortalities. **Wild-7:** Schedule construction during daylight hours. **Wild-8:** Establish buffers around raptor nests. **Wild-9:** Time vegetation clearing outside of nesting season and provide mitigation for nesting birds. **Hab-3:** Temporary laydown areas. **Hab-4:** Develop TAC. **Hab-6:** Work with EFSEC on final Project layout and design. **Spec-4:** Implement burrowing owl–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: ferruginous hawk	Turbine Option 1 Turbine Option 2 BESSs Substations	Construction of turbines and associated roads and power lines may result in the direct and indirect loss of habitat in core and range ferruginous hawk habitat. Nesting success could be impacted by construction activities proximal to the nest or activities change prey abundance.	High	Short Term (disturbance) Constant (habitat loss)	Probable (disturbance) Unavoidable (habitat loss)	Confined	**Wild-1:** Review 2-year raptor and bat monitoring program. **Wild-4:** Avoid use of pesticides and rodenticides. **Wild-5:** Limit construction disturbance by identifying sensitive areas. **Wild-6:** Maintain database of road mortalities. **Wild-8:** Establish buffers around raptor nests. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-3:** Temporary laydown areas **Hab-4:** Develop TAC. **Hab-6:** Work with EFSEC on final Project layout and design. **Spec-5:** Implement ferruginous hawk–specific mitigation.	None identified

Table ES-4a: Summary of Potential Impacts by Component during Construction of the Proposed Action

Section	Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Wildlife and Habitat (Section 4.6)	Special status species: ferruginous hawk	Solar Arrays	Three historic nesting locations would be directly impacted at the East Solar Array.	Medium	Constant	Unavoidable	Limited	**Wild-1:** Review 2-year raptor and bat monitoring program. **Wild-4:** Avoid use of pesticides and rodenticides. **Wild-5:** Limit construction disturbance by identifying sensitive areas. **Wild-6:** Maintain database of road mortalities. **Wild-8:** Establish buffers around raptor nests. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-3:** Temporary laydown areas **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Spec-5:** Implement ferruginous hawk–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: golden eagle	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Construction of the Project could disturb golden eagles, resulting in avoidance of the Project site, though golden eagle nesting has not been reported within 10 miles of the Lease Boundary.	Negligible	Short Term	Unlikely	Confined	**Wild-1:** Review 2-year raptor and bat monitoring program. **Wild-2:** Use wildlife-proof trash containers. **Wild-3:** Review USFWS eagle mortality consultation. **Wild-4:** Avoid use of pesticides and rodenticides. **Wild-5:** Limit construction disturbance by identifying sensitive areas. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Veg-1:** Tree Avoidance. **Spec-3:** Implement eagle-specific mitigation.	None identified

Table ES-4a: Summary of Potential Impacts by Component during Construction of the Proposed Action

Section	Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Wildlife and Habitat (Section 4.6)	Special status species: great blue heron and sandhill crane	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Construction may disturb birds flying over the Lease Boundary, resulting in bird flight paths being diverted around the area. Construction may result in the loss of foraging habitat.	Negligible	Short Term (construction disturbance, construction mortality) Long Term (habitat loss)	Feasible (disturbance, mortality) Unavoidable (habitat loss)	Confined	**Wild-1:** Review 2-year raptor and bat monitoring program. **Wild-4:** Avoid use of pesticides and rodenticides. **Wild-5:** Limit construction disturbance by identifying sensitive areas. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Spec-6:** Implement great blue heron, sandhill crane, and tundra swan–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: loggerhead shrike	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Construction may result in direct and indirect (disturbance) habitat loss. Mortality may occur from interactions with machinery and destruction of nests.	Low	Short Term (construction disturbance, construction mortality) Constant (habitat loss)	Probable (disturbance, mortality) Unavoidable (Habitat loss)	Confined	**Wild-4:** Avoid use of pesticides and rodenticides. **Wild-5:** Limit disturbance by identifying sensitive areas. **Wild-6:** Maintain database of road mortalities. **Wild-7:** Schedule construction during daylight hours. **Wild-9:** Time vegetation clearing outside of nesting season and provide mitigation for nesting birds. **Hab-2:** Minimize transmission line crossings. **Hab-3:** Temporary laydown areas. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on Final Project layout and design. **Spec-7:** Implement loggerhead shrike, sagebrush sparrow, sage thrasher, and Vaux's swift–specific mitigation.	None identified

Table ES-4a: Summary of Potential Impacts by Component during Construction of the Proposed Action

Section	Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Wildlife and Habitat (Section 4.6)	Special status species: prairie falcon	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Construction of the Project is predicted to result in the direct loss of suitable foraging habitat for prairie falcon. Disturbance from construction activities may result in disturbance to prairie falcons.	Medium	Short Term (construction disturbance, construction mortality) Constant (habitat loss)	Probable (disturbance, mortality) Unavoidable (Habitat loss)	Confined	**Wild-1:** Review 2-year raptor and bat monitoring program. **Wild-4:** Avoid use of pesticides and rodenticides. **Wild-5:** Limit construction disturbance by identifying sensitive areas. **Wild-6:** Maintain database of road mortalities. **Wild-8:** Establish buffers around raptor nests. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-3:** Temporary laydown areas **Hab-4:** Develop TAC. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-1:** Tree avoidance. **Spec-8:** Implement prairie falcon–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: ring-necked pheasant	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Construction of the Project is predicted to result in the direct loss of suitable foraging habitat for ring-necked pheasant. Disturbance from construction activities may result in indirect habitat loss. Access roads may result in collisions with ring-necked pheasants.	Low	Short Term (construction disturbance, construction mortality) Long Term (habitat loss)	Probable (disturbance, mortality) Unavoidable (habitat loss)	Confined	**Wild-5:** Limit disturbance by identifying sensitive areas. **Wild-6:** Maintain database of road mortalities. **Wild-9:** Time vegetation clearing outside of nesting season and provide mitigation for nesting birds. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Spec-9:** Implement ring-necked pheasant–specific mitigation.	None identified

Table ES-4a: Summary of Potential Impacts by Component during Construction of the Proposed Action

Section	Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Wildlife and Habitat (Section 4.6)	Special status species: sagebrush sparrow sage thrasher	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Construction may result in direct and indirect habitat loss. Mortality may occur from interactions with machinery and destruction of nests.	Low	Short Term (construction disturbance, construction mortality) Constant (habitat loss)	Probable (disturbance, mortality) Unavoidable (Habitat loss)	Confined	**Wild-4:** Avoid use of pesticides and rodenticides. **Wild-5:** Limit disturbance by identifying sensitive areas. **Wild-6:** Maintain database of road mortalities. **Wild-7:** Schedule construction during daylight hours. **Wild-9:** Time vegetation clearing outside of nesting season and provide mitigation for nesting birds. **Hab-2:** Minimize transmission line crossings. **Hab-3:** Temporary laydown areas **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Spec-7:** Implement loggerhead shrike, sagebrush sparrow, sage thrasher, and Vaux's swift–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: tundra swan	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Construction may result in the disturbance and loss of suitable foraging habitat and disruption of birds flying over the Lease Boundary.	Low	Short Term (construction disturbance, construction mortality) Long Term (habitat loss)	Feasible (disturbance, mortality) Unavoidable (habitat loss)	Confined	**Wild-1:** Review 2-year raptor and bat monitoring program. **Wild-4:** Avoid use of pesticides and rodenticides. **Wild-5:** Limit construction disturbance by identifying sensitive areas. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Spec-6:** Implement great blue heron, sandhill crane, and tundra swan–specific mitigation.	None identified

Table ES-4a: Summary of Potential Impacts by Component during Construction of the Proposed Action

Section	Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Wildlife and Habitat (Section 4.6)	Special status species: Vaux's swift	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Construction of the Project could disturb Vaux's swift in flight over the Lease Boundary.	Negligible	Short Term	Unlikely	Confined	**Wild-4:** Avoid use of pesticides and rodenticides. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Spec-7:** Implement loggerhead shrike, sagebrush sparrow, sage thrasher, and Vaux's swift–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: black-tailed jackrabbit white-tailed jackrabbit	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Construction of the Project is predicted to result in the direct loss of suitable habitat for jackrabbit. Disturbance from construction activities may result in indirect habitat loss. Access roads may result in collisions with jackrabbits, barriers to movement, and increased fragmentation.	Low	Short Term (construction disturbance, construction mortality) Constant (habitat loss)	Probable (disturbance, mortality) Unavoidable (habitat loss)	Confined	**Wild-4:** Avoid use of pesticides and rodenticides. **Wild-5:** Limit disturbance by identifying sensitive areas. **Wild-6**: Maintain database of road mortalities. **Hab-1:** Avoid corridors. **Hab-3**: Temporary laydown areas **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Spec-10:** Implement black and white-tailed jackrabbit–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: Townsend's big-eared bat	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Construction activities could disturb Townsend's big-eared bat foraging in the Lease Boundary.	Negligible	Short Term	Feasible	Confined	**Wild-4**: Avoid use of pesticides and rodenticides. **Wild-7:** Schedule construction during daylight hours. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Spec-11:** Implement Townsend's big-eared bat–specific mitigation.	None identified

Table ES-4a: Summary of Potential Impacts by Component during Construction of the Proposed Action

Section	Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Wildlife and Habitat (Section 4.6)	Special status species: Townsend's ground squirrel	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Construction of the Project and associated access roads are predicted to result in the loss of suitable Townsend's ground squirrel habitat and destruction of colonies. Mortality may occur during construction work proximal to colonies and along access roads.	Medium	Short Term (construction disturbance, construction mortality) Constant (habitat loss)	Probable (disturbance, mortality) Unavoidable (habitat loss)	Confined	**Wild-4:** Avoid use of pesticides and rodenticides. **Wild-5:** Limit disturbance by identifying sensitive areas. **Wild-6:** Maintain database of road mortalities. **Hab-1:** Avoid corridors. **Hab-3:** Temporary laydown areas **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Spec-12:** Implement Townsend's ground squirrel–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: pronghorn antelope	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Construction is predicted to result in direct loss of pronghorn antelope habitat. Activity associated with construction may result in indirect habitat loss. Increased traffic on existing and new access roads may result in pronghorn antelope mortality	Medium	Short Term (construction disturbance) Constant (habitat loss)	Probable (disturbance) Unavoidable (habitat loss)	Confined	**Wild-5:** Limit disturbance by identifying sensitive areas. **Wild-6:** Maintain database of road mortalities. **Hab-1:** Avoid corridors. **Hab-3:** Temporary laydown areas **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Spec-13:** Implement pronghorn antelope–specific mitigation.	None identified
Energy (Section 4.7)	Consumption of Raw Materials and Commodities	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	The installation of a turbine would require steel for support structures, fuel for construction equipment and vehicles, and concrete for foundations. The manufacturing of concrete within the Project vicinity would require water sourced locally.	Low	Temporary (for a single component) Short Term (for the entire component)	Unavoidable	Local to Regional (depending on component)	**ENR-1:** Executed water supply agreement.	None identified

Table ES-4a: Summary of Potential Impacts by Component during Construction of the Proposed Action

Section	Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Land and Shoreline Use (Section 4.8)	Agriculture	Turbine Option 1 Turbine Option 2 BESSs Substations	It may be necessary to remove cattle from areas where blasting or heavy equipment operations take place. Project construction could delay agricultural activities for short durations on adjacent properties. Reduced access to fields within the Lease Boundary could impact existing dryland agricultural management programs. Limited but measurable acreage would be taken out of wheat production.	Negligible (farm plan modifications) Low (decrease productivity)	Temporary (brief access modifications) Short Term (seasonal restrictions)	Unavoidable	Limited (small area) Regional (decreased productivity)	**LSU-1:** The Applicant would prepare a livestock management plan. **LSU-2:** The Applicant would prepare a dryland farming management plan. **LSU-3:** Arrange for the removal of livestock.	None identified
Land and Shoreline Use (Section 4.8)	Agriculture	Solar Arrays	It may be necessary to remove cattle from areas where heavy equipment operations take place. Project construction could delay agricultural activities for short durations on adjacent properties. Reduced access to fields within the Lease Boundary could impact existing dryland agricultural management programs. Temporarily and permanently impacted dryland agricultural acreage from solar array construction would equate to approximately 0.3% of the state's annual wheat production.	Low	Temporary (brief access modifications) Short Term (seasonal restrictions)	Unavoidable	Limited (small area) Regional (decreased productivity)	**LSU-1:** The Applicant would prepare a livestock management plan. **LSU-2:** The Applicant would prepare a dryland farming management plan. **LSU-3:** Arrange for the removal of livestock.	None identified
Historic and Cultural Resources (Section 4.9)	Not Eligible Archaeological Historic Period Isolates and Sites	Turbine Option 1 Turbine Option 2 Solar Arrays	Impacts resulting in the partial or complete loss of non-sensitive resources of limited historical value.	Negligible	Constant	Probable	Confined	**CR-2:** Archaeological and Architectural Resources Mitigation	None identified
Historic and Cultural Resources (Section 4.9)	Unevaluated Archaeological Historic Period Isolates and Sites	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Resources to be avoided through application of the APP. Without evaluation, magnitude of impact is high but is unlikely to occur due to the APP. Potential for the unplanned and accidental loss of unevaluated resources.	Medium	Constant	Unlikely	Confined	**CR-2:** Archaeological and Architectural Resources Mitigation	None identified

Table ES-4a: Summary of Potential Impacts by Component during Construction of the Proposed Action

Section	Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Historic and Cultural Resources (Section 4.9)	Not Eligible or Unevaluated Archaeological Precontact Period Isolates and Sites	Turbine Option 1 Turbine Option 2	Resources to be avoided through application of the APP. Impacts on environmental setting—visual, air quality and noise may occur.	High	Constant	Unlikely	Confined	**CR-2:** Archaeological and Architectural Resources Mitigation	Significant for partial or complete loss of archaeological isolates. However, discussions with affected Tribes and DAHP could provide more detailed information about the impacts and potential mitigation. This may change the impact significance rating.
Historic and Cultural Resources (Section 4.9)	Not Eligible Architectural Resources	Turbine Option 1 Turbine Option 2 Solar Arrays	Impacts resulting in the partial or complete loss of non-sensitive resources of limited historical value. Impacts on environmental setting of resources (visual etc.).	Negligible	Short Term	Probable	Local	**CR-2:** Archaeological and Architectural Resources Mitigation	None identified
Historic and Cultural Resources (Section 4.9)	Eligible Architectural Resources	Turbine Option 1 Turbine Option 2 Solar Arrays	Impacts on environmental setting of resources (visual etc.).	High	Short Term	Unavoidable	Local	**CR-2:** Archaeological and Architectural Resources Mitigation	None identified
Historic and Cultural Resources (Section 4.9)	Evaluated, Recommended Not Eligible Architectural Resources	Solar Arrays	Impacts resulting in the partial or complete loss of non-sensitive resources believed to be of limited historical value. Impacts on environmental setting – visual, air quality, and noise.	Low	Short Term	Probable	Local	**CR-2:** Archaeological and Architectural Resources Mitigation	None identified
Historic and Cultural Resources (Section 4.9)	Unknown/ Unidentified/Unevaluated Historic and Cultural Resources	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Impacts potentially resulting in the partial or complete loss of significant resources that are unknown, unidentified, or unevaluated for the NRHP.	High	Constant	Feasible	Local	**CR-2:** Archaeological and Architectural Resources Mitigation	None identified
Historic and Cultural Resources (Section 4.9)	Traditional Cultural Properties	Turbine Option 1 Turbine Option 2 Solar Arrays Substations BESSs	Impacts resulting in the partial or complete loss of resources. Impacts on environmental setting - inability to view cultural landscapes.	High	Constant	Probable	Regional	**CR-1:** Traditional Cultural Properties Mitigation	Significant for partial or complete loss of traditional cultural properties and resources. However, discussions with affected Tribes could provide more detailed information about the impacts and potential mitigation. This may change the impact significance rating.
Visual Aspects, Light and Glare (Section 4.10)	Visual Aspect	Turbine Option 1 Turbine Option 2	Activities would attract attention and would modify the localized existing landscape setting.	Medium	Short Term	Probable	Local	No mitigation identified	None identified

Table ES-4a: Summary of Potential Impacts by Component during Construction of the Proposed Action

Section	Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Recreation (Section 4.12)	Recreation – Use	Turbine Option 1 Turbine Option 2	Construction of the turbines would limit recreational activities that occur on public land in areas near construction, as well as impede cyclists' use of established routes during the transportation of equipment and materials.	Medium	Short Term	Unavoidable	Local	**R-1:** Work with DNR and Benton County to identify new recreational activities and/or improve existing recreational activities within Lease Boundary (e.g., multi-use trails).	None identified
Recreation (Section 4.12)	Recreation – Use	Solar Arrays	Construction of the Sellards Solar Field would restrict access to a parcel of DNR-administered land within the Lease Boundary resulting in a high impact.	High	Long Term	Unavoidable	Limited	**R-1:** Work with DNR and Benton County to identify new recreational activities and/or improve existing recreational activities within Lease Boundary (e.g., multi-use trails).	None identified
Recreation (Section 4.12)	Recreation – Recreational Experience	Turbine Option 1 Turbine Option 2 Solar Arrays	Indirect impacts related to visual resources and noise could occur at recreation sites.	High	Long Term	Unavoidable	Regional	**R-2:** Provide informational boards, as approved by DNR and EFSEC, at viewpoints associated with scenic areas of interest.	None identified
Recreation (Section 4.12)	Recreation – Public Health and Safety	Turbine Option 1 Turbine Option 2 Solar Arrays	The Project's potential to affect the health and safety of recreationists using the area for paragliding, hang gliding, or biking would result in a medium impact.	Medium	Long Term	Unavoidable	Regional	**R-3:** Work with the local and regional clubs to provide and maintain a plan to keep recreationists safe.	None identified
Public Health and Safety (Section 4.13)	Fire (Worker Health and Safety)	Turbine Option 1 Turbine Option 2	Fire resulting from Project construction is unlikely, but wildfire risk in the area is considered high. For instance, combustible materials and lubricants are contained in the nacelle of the turbines. Diesel-powered generators may be used during construction. Use of these materials could pose a fire risk.	Medium	Temporary	Feasible	Limited	**Veg-1:** Pre-approval from EFSEC before topping or removal of trees that pose a hazard to collector lines	None identified
Public Health and Safety (Section 4.13)	Smoke and Haze (Public Health)	Turbine Option 1 Turbine Option 2	Fire resulting from Project construction is unlikely, but wildfire risk in the area is considered high. For instance, combustible materials and lubricants are contained in the nacelle of the turbines. Diesel-powered generators may be used during construction. Use of these materials could pose a fire risk.	Medium	Temporary	Feasible	Regional	**Veg-1:** Pre-approval from EFSEC before topping or removal of trees that pose a hazard to collector lines	None identified
Public Health and Safety (Section 4.13)	Fire (Worker Health and Safety)	Solar Arrays BESSs Substations	Fire resulting from solar array, substations, and BESSs construction is unlikely, but wildfire risk in the area is considered high.	Medium	Temporary	Unlikely	Limited	**Veg-1:** Pre-approval from EFSEC before topping or removal of trees that pose a hazard to collector lines	None identified

Table ES-4a: Summary of Potential Impacts by Component during Construction of the Proposed Action

Section	Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Public Health and Safety (Section 4.13)	Smoke and Haze (Public Health)	Solar Arrays BESSs Substations	If a fire were to occur during construction of the solar arrays, substations, or BESSs, indirect impacts could include smoke or haze, and a potential reduction in emergency response services.	Medium	Temporary	Unlikely	Regional	**Veg-1:** Pre-approval from EFSEC before topping or removal of trees that pose a hazard to collector lines	None identified
Public Health and Safety (Section 4.13)	Release of Hazardous Materials	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Hazardous materials, including diesel fuel, lubricating oils, hydraulic fluid, paints, and solvents would be used and stored on site. Spill kits would be maintained, minimizing the risk of a release if a spill were to occur.	Medium	Temporary	Unlikely	Limited	**Veg-1:** Pre-approval from EFSEC before topping or removal of trees that pose a hazard to collector lines	None identified
Transportation (Section 4.14)	Vehicular Traffic	Turbine Option 1 Turbine Option 2	Traffic volumes would increase measurably during transportation of material and equipment for the construction of the turbines. The potential for traffic volumes and slower, oversized roads would likely decrease level of service for intersections near the Lease Boundary and highways/ freeways. The increase in traffic volumes and the size of construction material may decrease roadway safety at intersections near the Project or on railroad crossings.	Medium	Short Term	Unavoidable	Regional	**TR-1:** Daily transport communication, including emergency numbers. **TR-2:** Operation Lifesaver safety presentation and training.	None identified
Transportation (Section 4.14)	Vehicular Traffic	Solar Arrays	Traffic volumes would increase measurably during transportation of material and equipment during the construction of the solar arrays and would likely decrease level of service for intersections near the Lease Boundary. The increase in traffic volumes may decrease roadway safety at intersections near the Project or on railroad crossings.	Medium	Short Term	Unavoidable	Local	**TR-1:** Daily transport communication, including emergency numbers. **TR-2:** Operation Lifesaver safety presentation and training.	None identified
Transportation (Section 4.14)	Vehicular Traffic	BESSs Substations	Traffic volumes may increase, but a decrease in level of service is not expected, nor is there the potential for roadway safety to decrease.	Low	Temporary	Probable	Local	**TR-1:** Daily transport communication, including emergency numbers. **TR-2:** Operation Lifesaver safety presentation and training.	None identified

Table ES-4a: Summary of Potential Impacts by Component during Construction of the Proposed Action

Section	Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Public Services and Utilities (Section 4.15)	Municipal Solid Waste	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Solid waste from the Project's construction would consist of various quantities of non-hazardous construction wastes. The landfills identified in the ASC maintain substantial capacity that would be sufficient to serve the Project and the region, simultaneously.	Low	Constant	Unavoidable	Local to Regional (depending on location of landfill)	**ENR-7:** Recycle all applicable components. **PSU-1:** Use of a licensed waste disposal facility.	None identified

Notes:

(a) Components were combined in the same cell if they received the same impact ratings for the identified topic.

(b) Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.

(c) Mitigation measures listed here are additional actions that EFSEC could impose to further reduce the impacts. See Section 4.1 for details.

(d) Significant unavoidable impacts are those that would remain even after all identified additional mitigation measures have been required by EFSEC.

Applicant = Horse Heaven Wind Farm, LLC; ASC = Application for Site Certification; BESS = battery energy storage system; BMP = best management practice; DNR = Washington State Department of Natural Resources; EFSEC = Washington Energy Facility Site Evaluation Council; EIS = Environmental Impact Statement; NRHP = National Register of Historic Places; SWPPP = stormwater pollution prevention plan; TAC = Technical Advisory Committee; Tribes = Yakama Nation, the Confederated Tribes of the Umatilla Indian Reservation, the Nez Perce Tribe, and the Wanapum Tribe; USFWS = U.S. Fish and Wildlife Service; WDFW = Washington Department of Fish and Wildlife; ZOI = zone of influence

Table ES-4b

Summary of Potential Impacts by Component during Operation of the Proposed Action

This Page Intentionally Left Blank

Table ES-4b: Summary of Potential Impacts by Component during Operation of the Proposed Action

Section	Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Earth Resources (Section 4.2)	Soils	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	It is anticipated that no new ground disturbance would occur. Access roads and cleared areas could be susceptible to increased soil erosion from a lack of stabilizing vegetation or hard cover and prior disturbance of the local soil profile. Soil erosion, because of operations, would be limited to gravel-surfaced areas, including the apron constructed around each turbine.	Low	Temporary	Feasible	Limited	**Veg-7:** Detailed Site Restoration Plan.	None identified
Earth Resources (Section 4.2)	Landslide Hazards and Ground Instability	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Existing ground instability, high rainfall rates, and strong earthquake shaking could cause landslides.	Low	Temporary	Feasible	Limited	**Veg-7:** Detailed Site Restoration Plan.	None identified
Earth Resources (Section 4.2)	Volcanic Activity	Turbine Option 1 Turbine Option 2 BESSs Substations	Hazards from ashfall to operational activities would include the following: ▪ Accumulation of ash on structures ▪ Clogging of electronics, machinery, and filters ▪ Suspension of abrasive fine particles in air and water ▪ Accumulation of ash on transportation routes and vegetation	Negligible	Temporary	Unlikely	Confined	**Veg-7:** Detailed Site Restoration Plan.	None identified
Water Resources (Section 4.4)	Panel Washing	Solar Arrays	Project operations would require water to wash solar array panels, which would infiltrate the surrounding ground and could impact water resources.	Negligible	Temporary	Unlikely	Confined	**W-9:** Minimize Water Use. **W-10:** Panel Washing.	None identified

Notes:
Tables continues below, notes apply to remainder of table
(a) Components were combined in the same cell if they received the same impact ratings for the identified topic.
(b) Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.
(c) Mitigation measures listed here are additional actions that EFSEC could impose to further reduce the impacts. See Section 4.1 for details.
(d) Significant unavoidable impacts are those that would remain even after all identified additional mitigation measures have been required by EFSEC.
Applicant = Horse Heaven Wind Farm, LLC;BESS = battery energy storage system; DNR = Washington State Department of Natural Resources; EFSEC = Washington Energy Facility Site Evaluation Council; FAA = Federal Aviation Administration; FTE = full-time equivalent; KOP = key observation point; LEED = Leadership in Energy and Environmental Design; O&M = operations and maintenance;
TAC = Technical Advisory Committee; USFWS = U.S. Fish and Wildlife Service; ZOI = zone of influence

Table ES-4b: Summary of Potential Impacts by Component during Operation of the Proposed Action

Section	Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Water Resources (Section 4.4)	Introduction of Hazardous Substances	Turbine Option 1 Turbine Option 2	Project operations could result in the accidental release of hazardous substances that could impact water resources.	Negligible	Temporary	Unlikely	Limited	**W-5:** Employee Training. **W-8:** Spill Response Equipment.	None identified
Water Resources (Section 4.4)	Impacts on Public Water Supply	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Project operations would rely on water from public water supply for operations.	Low	Temporary	Feasible	Regional	**W-9:** Minimize Water Use. **W-10:** Panel Washing.	None identified
Vegetation (Section 4.5)	Habitat Degradation	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Project operations could result in habitat degradation from the introduction of hazardous substances, introduction and spread of noxious weeds and invasive plants, and deposition of dust.	Low	Long Term	Feasible	Local	**Veg-5:** Operation and Decommissioning Dust Control Plan.	None identified
Vegetation (Section 4.5)	Habitat Fragmentation	Turbine Option 1 Turbine Option 2 Solar Arrays	Project operations could result in habitat fragmentation from edge effects and fire.	Low	Long Term	Feasible	Local	**Veg-5:** Operation and Decommissioning Dust Control Plan.	None identified
Vegetation (Section 4.5)	Habitat Fragmentation	BESSs	Project operations could result in habitat fragmentation from edge effects and fire.	Low	Long Term	Feasible	Local	**Veg-5:** Operation and Decommissioning Dust Control Plan.	None identified
Vegetation (Section 4.5)	Habitat Fragmentation	Substations	Project operations could result in habitat fragmentation from edge effects and fire.	Low	Long Term	Unlikely	Local	**Veg-5:** Operation and Decommissioning Dust Control Plan.	None identified
Wildlife and Habitat (Section 4.6)[28]	Habitat loss	Turbine Option 1 Turbine Option 2	The Project would result in the direct loss of habitat through operation of the turbines and associated infrastructure. The Project may result in indirect habitat loss through degradation of habitat in ZOI created by disturbances (e.g., noise, light) from turbines and associated infrastructure.	Medium	Constant	Unavoidable	Local	**Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-1:** Tree Avoidance. **Veg-4:** As-built report and offset calculation.	None identified

[28] Blue highlight identifies Impacts of Medium and High magnitude.

Table ES-4b: Summary of Potential Impacts by Component during Operation of the Proposed Action

Section	Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Wildlife and Habitat (Section 4.6)	Habitat loss	Solar Arrays	The Project would result in the direct loss of habitat through operation of the solar arrays and associated infrastructure. The Project may result in indirect habitat loss through degradation of habitat in ZOI created by disturbances from solar arrays and associated infrastructure.	Medium	Constant	Unavoidable	Confined	**Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-1:** Tree Avoidance. **Veg-4:** As-built report and offset calculation.	None identified
Wildlife and Habitat (Section 4.6)	Habitat Loss	BESSs Substations	The Project would result in the direct loss of habitat through operation of the BESSs and substations. The operation of the BESSs and substations may also result in indirect habitat loss through degradation of habitat in the 0.5-mile ZOI created by disturbances from these features.	Negligible	Long Term	Unavoidable	Limited	**Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-1:** Tree Avoidance. **Veg-4:** As-built report and offset calculation.	None identified
Wildlife and Habitat (Section 4.6)	Mortality of non-special status species	Turbine Option 1 Turbine Option 2	The Project may result in mortality of aerial species (birds and bats) through collisions with turbines, strikes with power lines, windows, and weather towers. Other sources of mortality on wildlife, including non-aerial species, include vehicle collisions and changes in food availability.	Medium	Long Term	Probable	Confined	**Wild-1:** Review 2-year raptor and bat monitoring program. **Wild-2:** Use wildlife-proof trash containers. **Wild-3:** Review USFWS eagle mortality consultation. **Wild-4:** Avoid use of pesticides and rodenticides. **Wild-6:** Maintain database of road mortalities. **Hab-4:** Develop TAC. **Hab-6:** Work with EFSEC on final Project layout and design.	None identified

Table ES-4b: Summary of Potential Impacts by Component during Operation of the Proposed Action

Section	Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Wildlife and Habitat (Section 4.6)	Mortality of non-special status species	Solar Arrays	Bird species, particularly water-associated species, may collide with solar arrays. Mortality of other species, such as herptile, could occur depending on conditions under the solar facilities.	Low	Long Term	Feasible	Confined	**Wild-1:** Review 2-year raptor and bat monitoring program. **Wild-2:** Use wildlife-proof trash containers. **Wild-3:** Review USFWS eagle mortality consultation. **Wild-4:** Avoid use of pesticides and rodenticides. **Wild-6:** Maintain database of road mortalities. **Hab-4:** Develop TAC.	None identified
Wildlife and Habitat (Section 4.6)	Mortality of non-special status species	BESSs Substations	Wildlife mortality may occur due to collisions with infrastructure, including BESSs and substations.	Negligible	Long Term	Unlikely	Limited	**Wild-1:** Review 2-year raptor and bat monitoring program. **Wild-2:** Use wildlife-proof trash containers. **Wild-3:** Review USFWS eagle mortality consultation. **Wild-4:** Avoid use of pesticides and rodenticides. **Wild-6:** Maintain database of road mortalities. **Hab-4:** Develop TAC.	None identified
Wildlife and Habitat (Section 4.6)	Barriers to movement and fragmentation	Turbine Option 1 Turbine Option 2	The operation of turbines, power lines, roadways, and other linear infrastructure could result in barriers to wildlife movement and fragment habitat. Barriers and fragmentation created during construction would predominantly remain through operation.	Medium	Long Term	Probable	Confined	**Wild-5:** Limit activity disturbance by identifying sensitive areas. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation	None identified

Table ES-4b: Summary of Potential Impacts by Component during Operation of the Proposed Action

Section	Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Wildlife and Habitat (Section 4.6)	Barriers to movement and fragmentation	Solar Arrays	The east solar field is situated on a movement corridor and may impact wildlife movement. Fencing around solar arrays is expected to create barriers for larger mammals. Herptiles, small mammals, and small birds are expected to be able to continue to access vegetation around the arrays through the fencing.	Medium	Long Term	Probable	Confined	**Wild-5:** Limit activity disturbance by identifying sensitive areas. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation	None identified
Wildlife and Habitat (Section 4.6)	Barriers to movement and fragmentation	BESSs Substations	BESSs and substations may create barriers to wildlife movement in the adjacent area.	Low	Long Term	Feasible	Limited	**Wild-5:** Limit activity disturbance by identifying sensitive areas. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation	None identified
Wildlife and Habitat (Section 4.6)	Special status species: Striped whipsnake and sagebrush lizard	Turbine Option 1 Turbine Option 2 Solar Array BESSs Substations	Impacts on shrub and shrub-steppe habitat may result in loss of suitable reptile habitat. Increased road networks in the Lease Boundary could increase the risk of mortality sagebrush lizard and striped whipsnake. Roadways may create barriers to reptile movement and further fragment reptile habitat.	Low	Constant	Feasible	Confined to Local	**Wild-6:** Maintain database of road mortalities. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation. **Spec-1:** Implement striped whipsnake and sagebrush lizard–specific mitigation.	None identified

Table ES-4b: Summary of Potential Impacts by Component during Operation of the Proposed Action

Section	Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Wildlife and Habitat (Section 4.6)	Special status species: American white pelican	Turbine Option 1 Turbine Option 2 Solar Arrays	American white pelicans have the potential for collision with turbines, and electrocution with overhead transmission lines. American white pelicans could collide with solar arrays as literature suggests water-associated birds may attempt to land on solar arrays if they are mistaken for water (lake effect).	Medium	Long Term	Unlikely	Confined	**Wild-1:** Review 2-year raptor and bat monitoring program. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Spec-2:** Implement American white pelican–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: American white pelican	BESSs Substations	Interactions with BESSs and substations are not expected.	Negligible	Long Term	Unlikely	Confined	**Wild-1:** Review 2-year raptor and bat monitoring program. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Spec-2:** Implement American white pelican–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: bald eagle	Turbine Option 1 Turbine Option 2	Bald eagles are estimated to be the 17th most likely large bird to collide with the turbines, with an estimated exposure index of 0.01. Further, turbines could create barriers to bald eagle movement over the Lease Boundary.	Low	Long Term	Feasible	Confined	**Wild-1:** Review 2-year raptor and bat monitoring program. **Wild-2:** Use wildlife-proof trash containers. **Wild-3:** Review USFWS eagle mortality consultation. **Wild-4:** Avoid use of pesticides and rodenticides. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Spec-3:** Implement eagle-specific mitigation.	None identified

Table ES-4b: Summary of Potential Impacts by Component during Operation of the Proposed Action

Section	Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Wildlife and Habitat (Section 4.6)	Special status species: bald eagle	Solar Arrays BESSs Substations	Solar arrays, BESSs, substations, and other ground-based disturbances could reduce foraging habitat for bald eagles, though the Lease Boundary is not expected to provide key or important bald eagle habitat.	Negligible	Long Term	Unavoidable	Confined	**Wild-2**: Use wildlife-proof trash containers. **Wild-3**: Review USFWS eagle mortality consultation. **Wild-4**: Avoid use of pesticides and rodenticides. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Spec-3:** Implement eagle-specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: burrowing owl	Turbine Option 1 Turbine Option 2	Permanent habitat loss from turbine footprint and roads would persist through operation. Operation of turbines could result in indirect burrowing owl habitat loss. Burrowing owls are not expected to collide with turbines but are susceptible to road-based mortality. Further, changes in prey distribution and abundance may change foraging.	Medium	Constant	Unavoidable	Confined	**Wild-4:** Avoid use of pesticides and rodenticides. **Wild-6:** Maintain database of road mortalities. **Wild-8:** Establish buffers around raptor nests. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation. **Spec-4:** Implement burrowing owl–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: burrowing owl	Solar Arrays BESSs Substations	Areas under solar arrays may continue to provide habitat for burrowing owls, depending on conditions under the arrays. Habitat altered by the BESSs and substations would be lost throughout operation. Increased traffic on roads used to access solar arrays, BESSs, and substructures may result in burrowing owl mortality.	Medium	Constant	Feasible	Confined	**Wild-4:** Avoid use of pesticides and rodenticides. **Wild-6:** Maintain database of road mortalities. **Wild-8:** Establish buffers around raptor nests. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation **Spec-4:** Implement burrowing owl–specific mitigation.	None identified

Table ES-4b: Summary of Potential Impacts by Component during Operation of the Proposed Action

Section	Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Wildlife and Habitat (Section 4.6)	Special status species: ferruginous hawk	Turbine Option 1 Turbine Option 2	Operation of the turbines could result in mortality due to collisions with turbines and power lines. Change in prey abundance may reduce hawk survivorship. Operation may also reduce the re-occupancy of nesting territories due to disturbance.	High	Constant	Feasible	Confined	**Wild-1:** Review 2-year raptor and bat monitoring program. **Wild-4:** Avoid use of pesticides and rodenticides. **Wild-6:** Maintain database of road mortalities. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation **Spec-5:** Implement ferruginous hawk–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: ferruginous hawk	Solar Arrays	Solar arrays may change prey structures, resulting in impacts on adult and young survivorship.	Medium	Constant	Feasible	Confined	**Wild-1:** Review 2-year raptor and bat monitoring program. **Wild-4:** Avoid use of pesticides and rodenticides. **Wild-6:** Maintain database of road mortalities. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation **Spec-5:** Implement ferruginous hawk–specific mitigation.	None identified

Table ES-4b: Summary of Potential Impacts by Component during Operation of the Proposed Action

Section	Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Wildlife and Habitat (Section 4.6)	Special status species: ferruginous hawk	BESSs Substations	Operation of the BESSs and substations may result in loss of potential foraging habitat for ferruginous hawk.	Negligible	Constant	Unavoidable	Limited	**Wild-1:** Review 2-year raptor and bat monitoring program. **Wild-4:** Avoid use of pesticides and rodenticides. **Wild-6:** Maintain database of road mortalities. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation **Spec-5:** Implement ferruginous hawk–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: golden eagle	Turbine Option 1 Turbine Option 2	Golden eagles are estimated to be the 22nd most likely large bird to collide with the turbines. Further, turbines could create barriers to golden eagle movement over the Lease Boundary.	Medium	Long Term	Feasible	Confined	**Wild-1:** Review 2-year raptor and bat monitoring program. **Wild-2:** Use wildlife-proof trash containers. **Wild-3:** Review USFWS eagle mortality consultation. **Wild-4:** Avoid use of pesticides and rodenticides. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Spec-3:** Implement eagle-specific mitigation.	None identified

Table ES-4b: Summary of Potential Impacts by Component during Operation of the Proposed Action

Section	Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Wildlife and Habitat (Section 4.6)	Special status species: golden eagle	Solar Arrays BESSs Substations	Solar arrays, BESSs, substations, and other ground-based disturbances could reduce foraging habitat for golden eagles, though the Lease Boundary is not expected to provide key or important golden eagle habitat.	Negligible	Long Term	Unavoidable	Confined	**Wild-2:** Use wildlife-proof trash containers. **Wild-3:** Review USFWS eagle mortality consultation. **Wild-4:** Avoid use of pesticides and rodenticides. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Spec-3:** Implement eagle-specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: great blue heron and sandhill crane	Turbine Option 1 Turbine Option 2	The operation of wind turbines may result in great blue heron and sandhill crane mortality and disturbance.	Medium	Long Term	Feasible	Confined	**Wild-1:** Review 2-year raptor and bat monitoring program. **Wild-4:** Avoid use of pesticides and rodenticides. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Spec-6:** Implement great blue heron, sandhill crane, and tundra swan–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: great blue heron and sandhill crane	Solar Arrays BESSs Substations	Habitat loss during construction to accommodate the solar arrays, BESSs, and substations would continue through operation.	Negligible	Long Term	Unavoidable	Confined	**Wild-1:** Review 2-year raptor and bat monitoring program. **Wild-4:** Avoid use of pesticides and rodenticides. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Spec-6:** Implement great blue heron, sandhill crane, and tundra swan–specific mitigation.	None identified

Table ES-4b: Summary of Potential Impacts by Component during Operation of the Proposed Action

Section	Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Wildlife and Habitat (Section 4.6)	Special status species: loggerhead shrike	Turbine Option 1 Turbine Option 2	Direct and indirect habitat loss would persist throughout Project operation. Loggerhead shrike mortality may occur due to strikes with turbines.	Medium	Constant	Unavoidable	Confined	**Wild-4:** Avoid use of pesticides and rodenticides. **Wild-6:** Maintain database of road mortalities. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation **Spec-7:** Implement loggerhead shrike, sagebrush sparrow, sage thrasher, and Vaux's swift–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: loggerhead shrike	Solar Arrays	Direct and indirect habitat loss would persist throughout Project operation.	Low	Constant	Unavoidable	Confined	**Wild-4:** Avoid use of pesticides and rodenticides. **Wild-6:** Maintain database of road mortalities. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation. **Spec-7:** Implement loggerhead shrike, sagebrush sparrow, sage thrasher, and Vaux's swift–specific mitigation.	None identified

Table ES-4b: Summary of Potential Impacts by Component during Operation of the Proposed Action

Section	Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Wildlife and Habitat (Section 4.6)	Special status species: loggerhead shrike	BESSs Substations	Direct and indirect habitat loss would persist throughout Project operation.	Negligible	Constant	Unavoidable	Confined	**Wild-4:** Avoid use of pesticides and rodenticides. **Wild-6:** Maintain database of road mortalities. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation. **Spec-7:** Implement loggerhead shrike, sagebrush sparrow, sage thrasher, and Vaux's swift–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: prairie falcon	Turbine Option 1 Turbine Option 2	Direct habitat loss would persist throughout Project operation. Operation of the turbines may disturb prairie falcons foraging in the Lease Boundary. Operation of the turbines may result in mortality of prairie falcons. Changes in prey density may change habitat suitability and survivorship of prairie falcons.	Medium	Constant	Unavoidable	Confined	**Wild-1:** Review 2-year raptor and bat monitoring program. **Wild-4:** Avoid use of pesticides and rodenticides. **Wild-6:** Maintain database of road mortalities. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation. **Spec-8:** Implement prairie falcon–specific mitigation.	None identified

Table ES-4b: Summary of Potential Impacts by Component during Operation of the Proposed Action

Section	Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Wildlife and Habitat (Section 4.6)	Special status species: prairie falcon	Solar Arrays	Solar arrays may change prey dynamics in the Lease Boundary (e.g., sheltering under arrays), thereby reducing habitat suitability and survivorship of prairie falcons.	Low	Constant	Feasible	Confined	**Wild-4:** Avoid use of pesticides and rodenticides. **Wild-6:** Maintain database of road mortalities. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation. **Spec-8:** Implement prairie falcon–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: prairie falcon	BESSs Substations	Direct habitat loss at the BESSs and substations would persist throughout operation.	Negligible	Constant	Unavoidable	Limited	**Wild-4:** Avoid use of pesticides and rodenticides. **Wild-6:** Maintain database of road mortalities. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation. **Spec-8:** Implement prairie falcon–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: ring-necked pheasant	Turbine Option 1 Turbine Option 2	Direct habitat loss would persist through Operation. Operation of the turbines may also result in indirect habitat loss. Ring-necked pheasant mortality may occur due to Project operation. Access roads may result in collisions with ring-necked pheasants.	Low	Long Term	Unavoidable	Confined	**Wild-6:** Maintain database of road mortalities. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Spec-9:** Implement ring-necked pheasant–specific mitigation.	None identified

Table ES-4b: Summary of Potential Impacts by Component during Operation of the Proposed Action

Section	Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Wildlife and Habitat (Section 4.6)	Special status species: ring-necked pheasant	Solar Arrays BESSs Substations	Direct habitat loss would persist throughout operation. Access roads may result in collisions with ring-necked pheasants.	Negligible	Long Term	Unavoidable	Confined	**Wild-6:** Maintain database of road mortalities **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Spec-9:** Implement ring-necked pheasant–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: sagebrush sparrow and sage thrasher	Turbine Option 1 Turbine Option 2 Solar Arrays	Direct and indirect habitat loss would persist throughout Project operation.	Medium	Constant	Unavoidable	Confined	**Wild-4:** Avoid use of pesticides and rodenticides. **Wild-6:** Maintain database of road mortalities. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation. **Spec-7:** Implement loggerhead shrike, sagebrush sparrow, sage thrasher, and Vaux's swift–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: sagebrush sparrow and sage thrasher	BESSs Substations	Direct and indirect habitat loss would persist throughout Project operation.	Negligible	Long Term	Unavoidable	Confined	**Wild-4:** Avoid use of pesticides and rodenticides. **Wild-6:** Maintain database of road mortalities. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation **Spec-7:** Implement loggerhead shrike, sagebrush sparrow, sage thrasher, and Vaux's swift–specific mitigation.	None identified

Table ES-4b: Summary of Potential Impacts by Component during Operation of the Proposed Action

Section	Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Wildlife and Habitat (Section 4.6)	Special status species: tundra swan	Turbine Option 1	Operation of turbines may result in the continued loss and disturbance of foraging habitat. Operation of Option 1 may result in tundra swan mortality through collision with turbines.	Low	Long Term	Feasible	Confined	**Wild-1:** Review 2-year raptor and bat monitoring program. **Wild-4:** Avoid use of pesticides and rodenticides. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Veg-4:** As-built report and offset calculation. **Spec-6:** Implement great blue heron, sandhill crane, and tundra swan–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: tundra swan	Turbine Option 2	Operation of turbines may result in the continued loss and disturbance of foraging habitat. Turbine Option 2 is predicted to have an exposure index of 0.	Negligible	Long Term	Feasible	Confined	**Wild-1:** Review 2-year raptor and bat monitoring program. **Wild-4:** Avoid use of pesticides and rodenticides. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Spec-6:** Implement great blue heron, sandhill crane, and tundra swan–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: tundra swan	Solar Arrays	Operation of the solar array may result in continued loss of foraging habitat. Tundra swans may be killed if attempting to land on solar arrays.	Low	Long Term	Feasible	Confined	**Wild-1:** Review 2-year raptor and bat monitoring program. **Wild-4:** Avoid use of pesticides and rodenticides. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Spec-6:** Implement great blue heron, sandhill crane, and tundra swan–specific mitigation.	None identified

Table ES-4b: Summary of Potential Impacts by Component during Operation of the Proposed Action

Section	Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Wildlife and Habitat (Section 4.6)	Special status species: tundra swan	BESSs Substations	Operation of the BESSs and substations may result in continued loss of foraging habitat.	Negligible	Long Term	Unavoidable	Limited	**Wild-1:** Review 2-year raptor and bat monitoring program. **Wild-4:** Avoid use of pesticides and rodenticides. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Spec-6:** Implement great blue heron, sandhill crane, and tundra swan–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: Vaux's swift	Turbine Option 1 Turbine Option 2	Vaux's swift migrating over the Lease Boundary are susceptible to strikes during migration.	Low	Long Term	Feasible	Confined	**Wild-4:** Avoid use of pesticides and rodenticides. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Spec-7:** Implement loggerhead shrike, sagebrush sparrow, sage thrasher, and Vaux's swift–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: Vaux's swift	Solar Arrays BESSs Substations	No effects on Vaux's swift from these facilities are expected.	Negligible	Long Term	Unlikely	Confined	**Wild-4:** Avoid use of pesticides and rodenticides. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Spec-7:** Implement loggerhead shrike, sagebrush sparrow, sage thrasher, and Vaux's swift–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: black-tailed jackrabbit and white-tailed jackrabbit	Turbine Option 1 Turbine Option 2	Operation of the turbines may result in indirect loss of jackrabbit habitat and mortality along access roads. Direct habitat loss is expected to persist throughout operation.	Medium	Constant	Unavoidable	Confined	**Wild-4:** Avoid use of pesticides and rodenticides. **Wild-6:** Maintain database of road mortalities. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation. **Spec-10:** Implement black and white-tailed jackrabbit–specific mitigation.	None identified

Table ES-4b: Summary of Potential Impacts by Component during Operation of the Proposed Action

Section	Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Wildlife and Habitat (Section 4.6)	Special status species: black-tailed jackrabbit and white-tailed jackrabbit	Solar Arrays	Solar arrays could provide shelter for jackrabbits reducing predation. Mortality may along access roads may occur.	Low	Constant	Feasible	Confined	**Wild-4:** Avoid use of pesticides and rodenticides. **Wild-6:** Maintain database of road mortalities. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation. **Spec-10:** Implement black and white-tailed jackrabbit–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: black-tailed jackrabbit and white-tailed jackrabbit	BESSs Substations	Operation of the turbines may result in direct loss of jackrabbit habitat and mortality along access roads.	Negligible	Long Term	Unavoidable	Limited	**Wild-4:** Avoid use of pesticides and rodenticides. **Wild-6:** Maintain database of road mortalities. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation. **Spec-10:** Implement black and white-tailed jackrabbit–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: Townsend's big-eared bat	Turbine Option 1 Turbine Option 2	Townsend's big-eared bat mortality may occur due to Project operation. Operation may result in indirect loss of foraging habitat.	Low	Long Term	Probable	Confined	**Wild-1:** Review 2-year raptor and bat monitoring program. **Wild-4:** Avoid use of pesticides and rodenticides. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Spec-11:** Implement Townsend's big-eared bat–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: Townsend's big-eared bat	Solar Arrays	Townsend's big-eared bat may collide with solar arrays during operation.	Low	Long Term	Unlikely	Confined	**Wild-4:** Avoid use of pesticides and rodenticides. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Spec-11:** Implement Townsend's big-eared bat–specific mitigation.	None identified

Table ES-4b: Summary of Potential Impacts by Component during Operation of the Proposed Action

Section	Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Wildlife and Habitat (Section 4.6)	Special status species: Townsend's big-eared bat	BESSs Substations	Interaction with BESSs and substations are not predicted.	Negligible	Long Term	Unlikely	Limited	**Wild-4:** Avoid use of pesticides and rodenticides. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Spec-11:** Implement Townsend's big-eared bat–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: Townsend's ground squirrel	Turbine Option 1 Turbine Option 2 Solar Arrays	Townsend's ground squirrel mortality may continue along access roads during operation. Operation of the solar arrays may alter Townsend's ground squirrel behavior by providing shelter. Mortality may occur along access roads.	Medium	Constant	Feasible	Confined	**Wild-4:** Avoid use of pesticides and rodenticides. **Wild-6:** Maintain database of road mortalities. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation. **Spec-12:** Implement Townsend's ground squirrel–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: Townsend's ground squirrel	BESSs Substations	Direct habitat loss would persist through operation. Mortality may occur along access roads during operation of BESSs and substations.	Negligible	Constant	Feasible	Limited	**Wild-4:** Avoid use of pesticides and rodenticides. **Wild-6:** Maintain database of road mortalities. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation. **Spec-12:** Implement Townsend's ground squirrel–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: pronghorn antelope	Turbine Option 1 Turbine Option 2	Operation of the Project may result in direct and indirect habitat loss to pronghorn antelope. Pronghorn antelope mortality may occur along maintenance roads.	Medium	Constant	Unavoidable	Confined	**Wild-6:** Maintain database of road mortalities. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation. **Spec-13:** Implement pronghorn antelope–specific mitigation.	None identified

Table ES-4b: Summary of Potential Impacts by Component during Operation of the Proposed Action

Section	Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Wildlife and Habitat (Section 4.6)	Special status species: pronghorn antelope	Solar Arrays	Pronghorn antelope would be precluded from solar arrays during operation due to fencing. Pronghorn antelope mortality may occur along maintenance roads.	Medium	Constant	Unavoidable	Confined	**Wild-6:** Maintain database of road mortalities. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation. **Spec-13:** Implement pronghorn antelope–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: pronghorn antelope	BESSs Substations	Pronghorn antelope would be precluded from BESSs and substations. Pronghorn antelope mortality may occur along maintenance roads.	Negligible	Long Term	Unavoidable	Limited	**Wild-6:** Maintain database of road mortalities. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation **Spec-13:** Implement pronghorn antelope–specific mitigation.	None identified
Energy (Section 4.7)	Consumption of Raw Materials and Commodities	Turbine Option 1 Turbine Option 2 Substations	Turbine maintenance may require generator-specific lubricants and fluids produced outside the Project vicinity. O&M vehicles would need an ongoing supply of fuel purchased locally. Water for the Project's O&M facility would be purchased from a local vendor and sourced from Kennewick. Aggregate for access road maintenance would be obtained locally.	Low	Long Term	Unavoidable	Local to Regional	**ENR-1:** Executed water supply agreement. **ENR-2:** Install high-efficiency electrical fixtures and appliances. **ENR-3:** Install high-efficiency security lighting. **ENR-4:** Install low-water-use flush toilets. **ENR-5:** Capture and recycle wash water.	None identified
Energy (Section 4.7)	Consumption of Raw Materials and Commodities	Solar Arrays BESSs	Using water to wash solar panels would impact the amount of available water that Kennewick would have to address future demands. O&M vehicles would need fuel purchased locally. Aggregate for access road maintenance would be obtained locally.	Low	Long Term	Unavoidable	Local	**ENR-1:** Executed water supply agreement. **ENR-2:** Install high-efficiency electrical fixtures and appliances. **ENR-3:** Install high-efficiency security lighting. **ENR-4:** Install low-water-use flush toilets. **ENR-5:** Capture and recycle wash water.	None identified

Table ES-4b: Summary of Potential Impacts by Component during Operation of the Proposed Action

Section	Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Land and Shoreline Use (Section 4.8)	Agriculture	Turbine Option 1 Turbine Option 2 BESSs Substations	Although livestock would be able to graze up to turbines and associated structures, limited but measurable acreage would remain out of agricultural production.	Negligible	Long Term	Unavoidable	Limited (small area) Regional (decreased productivity)	**LSU-1:** The Applicant would prepare a livestock management plan. **LSU-2:** The Applicant would prepare a dryland farming management plan.	None identified
Land and Shoreline Use (Section 4.8)	Agriculture	Solar Arrays	Exclusionary fencing would be installed around the solar arrays. Exclusionary fencing would prevent the solar array project areas from being used for agricultural activities throughout the Project's operations stage. The loss of available farmland would result in a reduction in dryland wheat production and, potentially, a loss in grazing areas for livestock.	Low	Long Term	Unavoidable	Limited (small area) Regional (decreased productivity)	**LSU-1:** The Applicant would prepare a livestock management plan. **LSU-2:** The Applicant would prepare a dryland farming management plan.	None identified
Historic and Cultural Resources (Section 4.9)	Eligible Architectural Resources	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Impacts on environmental setting—visual, air quality and noise.	High	Constant	Unavoidable	Local	**CR-2:** Archaeological and Architectural Resources Mitigation	None identified
Historic and Cultural Resources (Section 4.9)	Traditional Cultural Properties	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Impacts on environmental setting – visual, air quality, noise, and loss of access.	High	Constant	Probable	Regional	**CR-1:** Traditional Cultural Properties Mitigation	Significant for partial or complete loss of traditional cultural properties and resources. However, discussions with affected Tribes could provide more detailed information about the impacts and potential mitigation. This may change the impact significance rating.
Historic and Cultural Resources (Section 4.9)	Unknown/ Unidentified Historic and Cultural Resources	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Impacts potentially resulting in the partial or complete loss of significant (previously unidentified) resources.	High	Constant	Feasible	Local	**CR-2:** Archaeological and Architectural Resources Mitigation	None identified

Table ES-4b: Summary of Potential Impacts by Component during Operation of the Proposed Action

Section	Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Visual Aspects, Light and Glare (Section 4.10)	Visual Aspect	Turbine Option 1 Turbine Option 2	The proposed wind turbines, and comprehensive Project, would dominate views from many KOP locations, and the landscape would appear strongly altered.	High	Long Term	Unavoidable	Regional	**VIS-1:** Relocate turbines located within the foreground distance. **VIS-2:** No advertising, cell antennas, commercial messages, or symbols placed on wind turbines. **VIS-3:** Maintain clean nacelles and towers.	Significant for Visual Aspects.
Visual Aspects, Light and Glare (Section 4.10)	Visual Aspect	Solar Arrays Substations Transmission Lines	The proposed solar arrays (all options), substations, and transmission lines would attract attention and would modify the existing landscape setting.	Medium	Long Term	Unavoidable	Regional	**VIS-4:** Use color-treated solar collectors and support structures. **VIS-5:** Avoid complete removal of vegetation beneath solar arrays. **VIS-6:** Install color-treated, opaque fencing to screen views of the solar arrays. **VIS-9:** Choose the type of transmission structure to best match the adjacent transmission lines.	None identified
Visual Aspects, Light and Glare (Section 4.10)	Visual Aspect	County Well & Bofer Canyon Solar Arrays	The proposed solar arrays (County Well and Bofer Canyon siting areas) would dominate views from some KOP locations, and the landscape would appear strongly altered in localized areas where there are limited existing landscape modifications.	High	Long Term	Unavoidable	Local	**VIS-4:** Use color-treated solar collectors and support structures. **VIS-5:** Avoid complete removal of vegetation beneath solar arrays. **VIS-6:** Install color-treated, opaque fencing to screen views of the solar arrays.	None identified
Visual Aspects, Light and Glare (Section 4.10)	Visual Aspect	Transmission Lines	The proposed transmission lines would dominate views from KOP 13 and the landscape would appear strongly altered in this localized area where there are limited existing landscape modifications.	High	Long Term	Unavoidable	Local	**VIS-6:** Maximize the span length across highways and other linear viewing locations. **VIS-7:** Choose the type of transmission structure to best match the adjacent transmission lines.	None identified
Visual Aspects, Light and Glare (Section 4.10)	Visual Aspect	BESSs	The BESSs would attract attention from some KOP locations and would modify the localized existing landscape setting.	Medium	Long Term	Unavoidable	Local	**VIS-8:** Design BESS to blend with the adjacent agricultural character.	None identified

Table ES-4b: Summary of Potential Impacts by Component during Operation of the Proposed Action

Section	Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Visual Aspects, Light and Glare (Section 4.10)	Shadow Flicker	Turbine Option 1 Turbine Option 2	Wind turbines would create shadow flicker that would impact Project participants.	Medium	Long Term	Probable	Confined	**SF-1:** The Applicant would attempt to avoid, minimize and mitigate shadow flicker at nearby residences. **SF-2:** The Applicant would set up a complaint resolution procedure.	None identified
Visual Aspects, Light and Glare (Section 4.10)	Light	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations Transmission Lines	Lighting for security purposes and to conform with FAA requirements would be visible outside the Lease Boundary but would have limited effect in terms of light trespass and sky glow degradation.	Low	Long Term	Unavoidable	Local	**LIG-1:** Use LEED-certified building exterior(s) and security lighting.	None identified
Recreation (Section 4.12)	Recreation – Use	Turbine Option 1 Turbine Option 2	Turbines would limit recreational activities (i.e., paragliding) that occur on public land near areas of operation.	Low	Long Term	Unavoidable	Local	**R-1:** Work with DNR and Benton County to identify new recreational activities and/or improve existing recreational activities within Lease Boundary (e.g., multi-use trails).	None identified
Recreation (Section 4.12)	Recreation – Use	Solar Arrays	Operation of the Sellards Solar Field would restrict access to a parcel of DNR-administered land within the Lease Boundary.	High	Long Term	Unavoidable	Limited	**R-1:** Work with DNR and Benton County to identify new recreational activities and/or improve existing recreational activities within Lease Boundary (e.g., multi-use trails).	None identified
Recreation (Section 4.12)	Recreation – Recreational Experience	Turbine Option 1 Turbine Option 2 Solar Arrays	Impacts on noise receptors would be limited, while visual impacts would occur regionally.	Low	Long Term	Unavoidable	Regional	**R-2:** Provide informational boards, as approved by DNR and EFSEC, at viewpoints associated with scenic areas of interest.	None identified
Recreation (Section 4.12)	Recreation – Public Health and Safety	Turbine Option 1 Turbine Option 2 Solar Arrays	The Project's potential to affect the health and safety of recreationists using the area for paragliding and hang gliding would results in a medium impact during the life of the Project. Impacts on recreationists would occur beyond neighboring receptors.	Medium	Long Term	Unavoidable	Regional	**R-3:** Work with the local and regional clubs to provide and maintain a plan to keep recreationists safe	Significant for paragliding and hang gliding public safety and health.
Public Health and Safety (Section 4.13)	Fire (Worker Health and Safety)	Substations	Substation transformers have a minimal risk of fire or explosion during construction.	Medium	Temporary	Feasible	Limited	No mitigation identified	None identified

Table ES-4b: Summary of Potential Impacts by Component during Operation of the Proposed Action

Section	Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Public Health and Safety (Section 4.13)	Fire (Worker Health and Safety)	BESSs	Lithium-ion batteries used for the BESSs may pose a risk of fire and explosion during operation because they may overheat, but the BESSs would include a fire suppression system.	Low to Medium (based on seasonal fire weather conditions)	Temporary	Feasible	Limited	No mitigation identified	None identified
Transportation (Section 4.14)	Vehicular Traffic	Solar Arrays	Operation of the solar arrays may require water trucks to deliver wash water to clean the panels. A decrease in level of service is not expected, nor is roadway safety expected to decrease.	Low	Long Term	Probable	Local	**TR-2:** Operation Lifesaver safety presentation and training	None identified
Public Services and Utilities (Section 4.15)	Wastewater	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Wastewater from the O&M facilities would be discharged to an on-site septic system. It is anticipated that the operations stage would use less than 5,000 gallons of water per day and that wastewater would be generated from kitchen and bathroom use.	Low	Long Term	Unavoidable	Local	**ENR-5:** Capture and recycle wash water.	None identified
Public Services and Utilities (Section 4.15)	Municipal Solid Waste	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Operation of the Project is expected to generate approximately one or two dumpsters of waste per week at the O&M facilities.	Low	Constant	Unavoidable	Local to Regional (depending on location of landfill)	**PSU-1:** Use of a licensed waste disposal facility.	None identified

Notes:
(a) Components were combined in the same cell if they received the same impact ratings for the identified topic.
(b) Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.
(c) Mitigation measures listed here are additional actions that EFSEC could impose to further reduce the impacts. See Section 4.1 for details.
(d) Significant unavoidable impacts are those that would remain even after all identified additional mitigation measures have been required by EFSEC.
Applicant = Horse Heaven Wind Farm, LLC;BESS = battery energy storage system; DNR = Washington State Department of Natural Resources; EFSEC = Washington Energy Facility Site Evaluation Council; FAA = Federal Aviation Administration; FTE = full-time equivalent; KOP = key observation point; LEED = Leadership in Energy and Environmental Design; O&M = operations and maintenance; TAC = Technical Advisory Committee; USFWS = U.S. Fish and Wildlife Service; ZOI = zone of influence

Table ES-4c

Summary of Potential Impacts by Component during Decommissioning of the Proposed Action

This Page Intentionally Left Blank

Table ES-4c: Summary of Potential Impacts by Component during Decommissioning of the Proposed Action

Section	Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Earth Resources (Section 4.2)	Geology	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	The likelihood of a foundation removal encountering bedrock is low. If bedrock were to be impacted during the decommissioning stage, then it would likely have already been encountered during the construction stage.	Low	Temporary	Probable	Limited	**Geo-1:** Avoid construction during wet periods. **Veg-7:** Detailed Site Restoration Plan.	None identified
Earth Resources (Section 4.2)	Soils	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Decommissioning activities associated with the Project could impact and disturb the soil profile, due to excavating foundations and utilities, removing unsealed areas, restoring the original ground profile, and rehabilitating vegetation.	Low	Short Term	Unavoidable	Limited	**Geo-1:** Avoid construction during wet periods. **Veg-7:** Detailed Site Restoration Plan.	None identified
Earth Resources (Section 4.2)	Topography	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	The Applicant would restore the original topographic profile in areas of previous development.	Low	Short Term	Probable	Limited	**Geo-1:** Avoid construction during wet periods. **Veg-7:** Detailed Site Restoration Plan.	None identified
Earth Resources (Section 4.2)	Earthquakes	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Prolonged earthquake ground shaking could cause minor damage to infrastructure if the intensity and duration of the shaking exceed structural seismic design levels.	Negligible	Temporary	Feasible	Confined	**Geo-1:** Avoid construction during wet periods. **Veg-7:** Detailed Site Restoration Plan.	None identified
Earth Resources (Section 4.2)	Landslide Hazards and Ground Instability	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Existing ground instability, high rainfall rates, and strong earthquake shaking could cause landslides.	Low	Temporary	Feasible	Limited	**Geo-1:** Avoid construction during wet periods. **Veg-7:** Detailed Site Restoration Plan.	None identified

Notes:
Table continues below, notes apply to remainder of table
(a) Components were combined in the same cell if they received the same impact ratings for the identified topic.
(b) Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.
(c) Mitigation measures listed here are additional actions that EFSEC could impose to further reduce the impacts. See Section 4.1 for details.
(d) Significant unavoidable impacts are those that would remain even after all identified additional mitigation measures have been required by EFSEC.
Applicant = Horse Heaven Wind Farm, LLC; BESS = battery energy storage system; DNR = Washington State Department of Natural Resources; EFSEC = Washington Energy Facility Site Evaluation Council; SWPPP = stormwater pollution prevention plan; TAC = Technical Advisory Committee; TUSFWS = U.S. Fish and Wildlife Service; WDFW = Washington Department of Fish and Wildlife; ZOI = zone of influence

Table ES-4c: Summary of Potential Impacts by Component during Decommissioning of the Proposed Action

Section	Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Earth Resources (Section 4.2)	Volcanic Activity	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Hazards from ashfall to decommissioning activities would include the following: ▪ Accumulation of ash on structures ▪ Clogging of electronics, machinery, and filters ▪ Suspension of abrasive fine particles in air and water ▪ Accumulation of ash on transportation routes and vegetation	Negligible	Temporary	Unlikely	Confined	**Geo-1:** Avoid construction during wet periods. **Veg-7:** Detailed Site Restoration Plan.	None identified
Water Resources (Section 4.4)	Physical Disturbance	Turbine Option 1 Turbine Option 2 Solar Arrays	Project decommissioning would result in physical disturbance that could impact surface water and wetlands, runoff and absorption capacity, floodplains, and groundwater resources.	Low	Short Term	Unavoidable	Confined	**W-1:** Least Risk Fish Windows. **W-2:** Minimize Work in Heavy Rain. **W-3:** Check Dams. **W-6:** Wetland SWPPP.	None identified
Water Resources (Section 4.4)	Physical Disturbance	BESSs Substations	Project decommissioning would result in physical disturbance that could impact surface water and wetlands, runoff and absorption capacity, floodplains, and groundwater resources.	Low	Short Term	Unavoidable	Limited	**W-1:** Least Risk Fish Windows. **W-2:** Minimize Work in Heavy Rain. **W-3:** Check Dams. **W-6:** Wetland SWPPP.	None identified
Water Resources (Section 4.4)	Change in Water Quality	Turbine Option 1 Turbine Option 2	Project decommissioning would require temporary disturbance, which could impact water quality.	Low	Temporary	Unlikely	Local	**W-1:** Least Risk Fish Windows. **W-2:** Minimize Work in Heavy Rain. **W-3:** Check Dams. **W-5:** Employee Training. **W-6:** Wetland SWPPP. **W-8:** Spill Response Equipment.	None identified
Water Resources (Section 4.4)	Change in Water Quality	Solar Arrays	Project decommissioning would require temporary disturbance areas to access and remove Project components located near ephemeral and intermittent streams and could result in changes to water quality.	Negligible	Temporary	Unlikely	Local	**W-1:** Least Risk Fish Windows. **W-2:** Minimize Work in Heavy Rain. **W-3:** Check Dams. **W-5:** Employee Training. **W-6:** Wetland SWPPP. **W-8:** Spill Response Equipment.	None identified
Water Resources (Section 4.4)	Change in Hydrology	Turbine Option 1 Turbine Option 2	Project decommissioning would require temporary disturbance to some ephemeral and intermittent streams but would restore the disturbance areas following decommissioning.	Low	Short Term	Unlikely	Limited	**W-3:** Check Dams.	None identified

Table ES-4c: Summary of Potential Impacts by Component during Decommissioning of the Proposed Action

Section	Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Water Resources (Section 4.4)	Introduction of Hazardous Substances	Turbine Option 1 Turbine Option 2	Project decommissioning could result in the introduction of hazardous substances to water resources.	Low	Temporary	Unlikely	Local	**W-5:** Employee Training. **W-8:** Spill Response Equipment.	None identified
Water Resources (Section 4.4)	Introduction of Hazardous Substances	Solar Arrays BESSs Substations	Project decommissioning could result in the introduction of hazardous substances to water resources.	Negligible	Temporary	Unlikely	Limited	**W-5:** Employee Training. **W-8:** Spill Response Equipment.	None identified
Water Resources (Section 4.4)	Impacts on Public Water Supply	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Project decommissioning could result in impacts on public water supply.	Low	Temporary	Unlikely	Regional	**W-9:** Minimize Water Use.	None identified
Vegetation (Section 4.5)[29]	Loss of Extent of Priority Habitat – Temporary Disturbance	Turbine Option 1 Turbine Option 2	Decommissioning of the Project would require temporary disturbance areas to remove Project components, which would result in direct loss of WDFW Priority Habitat.	High	Short Term	Unavoidable	Limited	**Veg-1:** Tree Avoidance. **Veg-6:** Decommissioning Legislated Requirements. **Veg-7:** Detailed Site Restoration Plan. **Veg-8:** Decommissioning Noxious Weed Management Plan.	None identified
Vegetation (Section 4.5)	Loss of Extent of Priority Habitat – Temporary Disturbance	East Solar Field	Site clearing associated with temporary disturbance would result in direct loss of acreage associated with WDFW Priority Habitat.	Medium	Short Term	Unavoidable	Limited	**Veg-1:** Tree Avoidance. **Veg-6:** Decommissioning Legislated Requirements. **Veg-7:** Detailed Site Restoration Plan. **Veg-8:** Decommissioning Noxious Weed Management Plan.	None identified
Vegetation (Section 4.5)	Loss of Extent of Priority Habitat – Temporary Disturbance	County Well Solar Field BESSs Substations	Site clearing associated with temporary disturbance would result in direct loss of acreage associated with WDFW Priority Habitat.	Negligible	Short Term	Unlikely	Limited	**Veg-1:** Tree Avoidance. **Veg-6:** Decommissioning Legislated Requirements. **Veg-7:** Detailed Site Restoration Plan. **Veg-8:** Decommissioning Noxious Weed Management Plan.	None identified

[29] Blue highlight identifies Impacts of Medium and High magnitude.

Table ES-4c: Summary of Potential Impacts by Component during Decommissioning of the Proposed Action

Section	Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Vegetation (Section 4.5)	Loss of Extent of Priority Habitat – Temporary Disturbance	Sellards Solar Field	Site clearing associated with temporary disturbance would result in direct loss of acreage associated with WDFW Priority Habitat.	Low	Short Term	Feasible	Limited	**Veg1:** Tree Avoidance. **Veg-6:** Decommissioning Legislated Requirements. **Veg-7:** Detailed Site Restoration Plan. **Veg-8:** Decommissioning Noxious Weed Management Plan.	None identified
Vegetation (Section 4.5)	Loss of Extent Other Habitat – Temporary Disturbance	Turbine Option 1 Turbine Option 2	Site clearing associated with temporary disturbance would result in direct loss of acreage associated with other habitat.	Low	Short Term	Unavoidable	Confined	**Veg-1:** Tree Avoidance. **Veg-6:** Decommissioning Legislated Requirements. **Veg-7:** Detailed Site Restoration. Plan. **Veg-8:** Decommissioning Noxious Weed Management Plan.	None identified
Vegetation (Section 4.5)	Loss of Extent Other Habitat – Temporary Disturbance	Solar Arrays BESSs Substations	Site clearing associated with temporary disturbance would result in direct loss of acreage associated with other habitat.	Negligible	Short Term	Unavoidable	Limited	**Veg-1:** Tree Avoidance. **Veg-6:** Decommissioning Legislated Requirements. **Veg-7:** Detailed Site Restoration Plan. **Veg-8:** Decommissioning Noxious Weed Management Plan.	None identified
Vegetation (Section 4.5)	Loss of Extent Special Status Plant Species	Turbine Option 1 Turbine Option 2 East Solar Field	Site clearing associated with decommissioning of the Project would result in direct loss of populations of special status plant species or their habitat.	Low	Constant	Unlikely	Local	**Veg-2:** Pre-Disturbance Surveys for Special Status Plant Species. **Veg-6:** Decommissioning Legislated Requirements. **Veg-7:** Detailed Site Restoration Plan. **Veg-8:** Decommissioning Noxious Weed Management Plan.	None identified
Vegetation (Section 4.5)	Loss of Extent Special Status Plant Species	Sellards Solar Field County Well Solar Field BESSs Substations	Site clearing associated with decommissioning of the Project would result in direct loss of populations of special status plant species or their habitat.	Negligible	Constant	Unlikely	Local	**Veg-2:** Pre-Disturbance Surveys for Special Status Plant Species. **Veg-6:** Decommissioning Legislated Requirements. **Veg-7:** Detailed Site Restoration Plan. **Veg-8:** Decommissioning Noxious Weed Management Plan.	None identified

Table ES-4c: Summary of Potential Impacts by Component during Decommissioning of the Proposed Action

Section	Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Vegetation (Section 4.5)	Habitat Degradation	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Project decommissioning could result in habitat degradation from the introduction of hazardous material, surface runoff, introduction or spread of invasive plant or noxious weeds, and the deposition of dust.	Low	Long Term	Feasible	Local	**Veg-5:** Operation and Decommissioning Dust Control Plan. **Veg-6:** Decommissioning Legislated Requirements. **Veg-7:** Detailed Site Restoration Plan. **Veg-8:** Decommissioning Noxious Weed Management Plan.	None identified
Vegetation (Section 4.5)	Habitat Fragmentation	Turbine Option 1 Turbine Option 2	Project decommissioning could result in habitat fragmentation from fire.	Low	Long Term	Feasible	Local	**Veg-6:** Decommissioning Legislated Requirements.	None identified
Vegetation (Section 4.5)	Habitat Fragmentation	Solar Arrays BESSs Substations	Project decommissioning could result in habitat fragmentation from fire.	Low	Long Term	Unlikely	Local	**Veg-6:** Decommissioning Legislated Requirements.	None identified
Wildlife and Habitat (Section 4.6)	Habitat loss	Turbine Option 1 Turbine Option 2	The Project would result in temporary loss of habitat during decommissioning. No new permanent habitat loss is expected, and restoration activities are expected to replace and/or enhance habitat loss created during construction and operation.	Negligible	Short Term	Unavoidable	Local	**Wild-5:** Limit construction disturbance by identifying sensitive areas. **Hab-7:** Roadway decommissioning. **Veg-1:** Tree Avoidance. **Veg-7:** Decommissioning revegetation plan.	None identified
Wildlife and Habitat (Section 4.6)	Habitat loss	Solar Arrays	The Project would result in temporary loss of habitat during decommissioning. No new permanent habitat loss is expected, and restoration activities are expected to replace and/or enhance habitat loss created during construction and operation.	Negligible	Short Term	Unavoidable	Confined	**Wild-5:** Limit construction disturbance by identifying sensitive areas. **Hab-7:** Roadway decommissioning. **Veg-1:** Tree Avoidance. **Veg-7:** Decommissioning revegetation plan.	None identified
Wildlife and Habitat (Section 4.6)	Habitat loss	BESSs Substations	The Project would result in temporary loss of habitat during decommissioning. No new permanent habitat loss is expected, and restoration activities are expected to replace and/or enhance habitat loss created during construction and operation.	Negligible	Short Term	Unavoidable	Limited	**Wild-5:** Limit construction disturbance by identifying sensitive areas. **Hab-7:** Roadway decommissioning. **Veg-1:** Tree Avoidance. **Veg-7:** Decommissioning revegetation plan.	None identified

Table ES-4c: Summary of Potential Impacts by Component during Decommissioning of the Proposed Action

Section	Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Wildlife and Habitat (Section 4.6)	Mortality of non-special status species	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Sources of wildlife injuries and mortalities during decommissioning include collisions with equipment; removal of nuisance wildlife; destruction of nests, dens, and burrows; and habitat loss. The risk of mortalities would be limited to the duration of decommissioning.	Negligible	Short Term	Feasible	Confined	**Wild-1:** Review 2-year raptor and bat monitoring program. **Wild-2:** Use wildlife-proof trash containers. **Wild-3:** Review USFWS eagle mortality consultation. **Wild-4:** Avoid use of pesticides and rodenticides. **Wild-5:** Limit activity disturbance by identifying sensitive areas. **Wild-6:** Maintain database of road mortalities. **Wild-7:** Schedule activities during daylight hours. **Wild-8:** Establish buffers around raptor nests.	None identified
Wildlife and Habitat (Section 4.6)	Barriers to movement and fragmentation	Turbine Option 1 Turbine Option 2 Solar Arrays	Decommissioning would remove Project-related barriers to movement and reduce habitat fragmentation by removing infrastructure and revegetating disturbed areas.	Negligible	Short Term	Feasible	Confined	**Wild-5:** Limit activity disturbance by identifying sensitive areas. **Hab-7:** Roadway decommissioning. **Veg-7:** Decommissioning revegetation plan.	None identified
Wildlife and Habitat (Section 4.6)	Barriers to movement and fragmentation	BESSs Substations	Decommissioning would remove Project-related barriers to movement and reduce habitat fragmentation by removing infrastructure and revegetating disturbed areas.	Negligible	Short Term	Feasible	Limited	**Wild-5:** Limit activity disturbance by identifying sensitive areas. **Hab-7:** Roadway decommissioning. **Veg-7:** Decommissioning revegetation plan.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: striped whipsnake and sagebrush lizard	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Ground disturbance and machinery use during Project decommissioning could result in mortality of striped whipsnake and sagebrush lizard.	Negligible	Short Term	Feasible	Confined	**Wild-5:** Limit construction disturbance by identifying sensitive areas. **Wild-6:** Maintain database of road mortalities. **Hab-4:** Develop TAC. **Hab-7:** Roadway decommissioning. **Veg-7:** Decommissioning revegetation plan. **Spec-1:** Implement striped whipsnake and sagebrush lizard–specific mitigation.	None identified

Table ES-4c: Summary of Potential Impacts by Component during Decommissioning of the Proposed Action

Section	Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Wildlife and Habitat (Section 4.6)	Special status species: American white pelican	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Decommissioning of the Project may disturb American white pelicans moving over the Lease Boundary.	Negligible	Short Term	Unlikely	Confined	**Hab-4:** Develop TAC. **Spec-2:** Implement American white pelican–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: bald eagle	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Decommissioning of the Project could disturb bald eagles, resulting in avoidance of the Project site.	Negligible	Short Term	Feasible	Confined	**Wild-2:** Use wildlife-proof trash containers. **Wild-3:** Review USFWS eagle mortality consultation. **Wild-4:** Avoid use of pesticides and rodenticides. **Wild-5:** Limit construction disturbance by identifying sensitive areas. **Veg-1:** Tree Avoidance. **Hab-4:** Develop TAC. **Spec-3:** Implement eagle-specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: burrowing owl	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Decommissioning may result in mortality from machinery operation over the Lease Boundary.	Negligible	Short Term	Unlikely	Confined	**Wild-1:** Review 2-year raptor and bat monitoring program. **Wild-4:** Avoid use of pesticides and rodenticides. **Wild-5:** Limit construction disturbance by identifying sensitive areas. **Wild-6:** Maintain database of road mortalities. **Wild-7:** Schedule activity to daylight hours. **Wild-8:** Establish buffers around raptor nests. **Hab-4:** Develop TAC. **Hab-7:** Roadway decommissioning. **Veg-7:** Decommissioning revegetation plan. **Spec-4:** Implement burrowing owl–specific mitigation.	None identified

Table ES-4c: Summary of Potential Impacts by Component during Decommissioning of the Proposed Action

Section	Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Wildlife and Habitat (Section 4.6)	Special status species: ferruginous hawk	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Decommissioning may result in mortality from machinery operation over the Lease Boundary.	Negligible	Short Term	Feasible	Confined	**Wild-1:** Review 2-year raptor and bat monitoring program. **Wild-4:** Avoid use of pesticides and rodenticides. **Wild-5:** Limit disturbance by identifying sensitive areas. **Wild-6:** Maintain database of road mortalities. **Wild-8:** Establish buffers around raptor nests. **Hab-4:** Develop TAC. **Hab-7:** Roadway decommissioning. **Veg-7:** Decommissioning revegetation plan. **Spec-5:** Ferruginous hawk–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: golden eagle	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Decommissioning of the Project could disturb golden eagles, resulting in avoidance of the Project site, though golden eagle nesting has not been reported within 10 miles of the Lease Boundary.	Negligible	Short Term	Unlikely	Confined	**Wild-2:** Use wildlife-proof trash containers. **Wild-3:** Review USFWS eagle mortality consultation. **Wild-4:** Avoid use of pesticides and rodenticides. **Wild-5:** Limit construction disturbance by identifying sensitive areas. **Veg-1:** Tree Avoidance. **Hab-4:** Develop TAC. **Spec-3:** Implement eagle-specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: great blue heron and sandhill crane	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Decommissioning activities may disturb birds flying over the Lease Boundary, resulting in bird flight paths being diverted around the area.	Negligible	Short Term	Feasible	Confined	**Wild-1:** Review 2-year raptor and bat monitoring program. **Wild-4:** Avoid use of pesticides and rodenticides. **Wild-5:** Limit disturbance by identifying sensitive areas. **Hab-4:** Develop TAC. **Spec-6:** Implement great blue heron, sandhill crane, and tundra swan–specific mitigation.	None identified

Table ES-4c: Summary of Potential Impacts by Component during Decommissioning of the Proposed Action

Section	Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Wildlife and Habitat (Section 4.6)	Special status species: loggerhead shrike	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Decommissioning may disturb birds foraging and nesting in the Lease Boundary. Machinery could result in mortality of birds and destruction of nests.	Negligible	Short Term	Feasible	Confined	**Wild-4:** Avoid use of pesticides and rodenticides. **Wild-5:** Limit disturbance by identifying sensitive areas. **Wild-6:** Maintain database of road mortalities. **Wild-7:** schedule activities to daylight hours. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-7:** Roadway decommissioning. **Veg-7:** Decommissioning revegetation plan **Spec-7:** Implement loggerhead shrike, sagebrush sparrow, sage thrasher, and Vaux's swift–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: prairie falcon	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Disturbance from decommissioning activities may result in disturbance to prairie falcons.	Negligible	Short Term	Unlikely	Confined	**Wild-4:** Avoid use of pesticides and rodenticides. **Wild-5:** Limit disturbance by identifying sensitive areas. **Wild-6:** Maintain database of road mortalities. **Wild-8:** Establish buffers around raptor nests. **Veg-1:** Tree Avoidance. **Hab-4:** Develop TAC. **Hab-7:** Roadway decommissioning. **Veg-7:** Decommissioning revegetation plan. **Spec-8:** Implement prairie falcon specific–mitigation.	None identified

Table ES-4c: Summary of Potential Impacts by Component during Decommissioning of the Proposed Action

Section	Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Wildlife and Habitat (Section 4.6)	Special status species: ring-necked pheasant	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Disturbance from decommissioning activities may result in indirect habitat loss. Access roads may result in collisions with ring-necked pheasants.	Negligible	Short Term	Feasible	Confined	**Wild-5:** Limit disturbance by identifying sensitive areas. **Wild-6:** Maintain database of road mortalities. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-7:** Roadway decommissioning **Veg-7:** Decommissioning revegetation plan **Spec-9:** Implement ring-necked pheasant–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: sagebrush sparrow and sage thrasher	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Decommissioning may disturb birds foraging and nesting in the Lease Boundary. Machinery could result in mortality of birds and destruction of nests.	Negligible	Short Term	Feasible	Confined	**Wild-4:** Avoid use of pesticides and rodenticides. **Wild-5:** Limit disturbance by identifying sensitive areas. **Wild-6:** Maintain database of road mortalities. **Wild-7:** Schedule activities to daylight hours. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-7:** Roadway decommissioning. **Veg-7:** Decommissioning revegetation plan. **Spec-7:** Implement loggerhead shrike, sagebrush sparrow, sage thrasher, and Vaux's swift–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: tundra swan	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Decommissioning may disturb tundra swans flying over and foraging in the Lease Boundary.	Negligible	Short Term	Feasible	Confined	**Wild-1:** Review 2-year raptor and bat monitoring program. **Wild-4:** Avoid use of pesticides and rodenticides. **Wild-5:** Limit disturbance by identifying sensitive areas. **Hab-4:** Develop TAC. **Spec-6:** Implement great blue heron, sandhill crane, and tundra swan–specific mitigation.	None identified

Table ES-4c: Summary of Potential Impacts by Component during Decommissioning of the Proposed Action

Section	Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Wildlife and Habitat (Section 4.6)	Special status species: Vaux's swift	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Decommissioning of the Project could disturb Vaux's swifts in flight over the Lease Boundary.	Negligible	Short Term	Unlikely	Confined	**Wild-4:** Avoid use of pesticides and rodenticides. **Hab-4:** Develop TAC. **Spec-7:** Implement loggerhead shrike, sagebrush sparrow, sage thrasher, and Vaux's swift–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: black-tailed jackrabbit and white-tailed jackrabbit	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Disturbance from decommissioning activities may result in indirect habitat loss. Access roads may result in collisions with jackrabbits.	Negligible	Short Term	Feasible	Confined	**Wild-4:** Avoid use of pesticides and rodenticides. **Wild-5:** Limit disturbance by identifying sensitive areas. **Wild-6:** Maintain database of road mortalities. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-7:** Roadway decommissioning. **Veg-7:** Decommissioning revegetation plan. **Spec-10:** Implement black and white-tailed jackrabbit–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: Townsend's big-eared bat	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Decommissioning activities could disturb Townsend's big-eared bat foraging in the Lease Boundary.	Negligible	Short Term	Unlikely	Confined	**Wild-4:** Avoid use of pesticides and rodenticides. **Wild-7:** Schedule construction during daylight hours. **Hab-4:** Develop TAC. **Spec-11:** Implement Townsend's big-eared bat–specific mitigation.	None identified
Wildlife and Habitat (Section 4.6)	Special status species: Townsend's ground squirrel	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Mortality may occur during decommissioning and along access roads.	Negligible	Short Term	Feasible	Confined	**Wild-4:** Avoid use of pesticides and rodenticides. **Wild-5:** Limit disturbance by identifying sensitive areas **Wild-6:** Maintain database of road mortalities **Hab-4:** Develop TAC. **Hab-7:** Roadway decommissioning. **Veg-7:** Decommissioning revegetation plan. **Spec-12:** Implement Townsend's ground squirrel–specific mitigation.	None identified

Table ES-4c: Summary of Potential Impacts by Component during Decommissioning of the Proposed Action

Section	Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Wildlife and Habitat (Section 4.6)	Special status species: pronghorn antelope	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Decommissioning is predicted to result in indirect habitat loss. Increased traffic on existing and new access roads may result in pronghorn antelope mortality.	Negligible	Short Term	Feasible	Confined	**Wild-5:** Limit disturbance by identifying sensitive areas. **Wild-6:** Maintain database of road mortalities **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-7:** Roadway decommissioning. **Veg-7:** Decommissioning revegetation plan. **Spec-13:** Implement pronghorn antelope–specific mitigation.	None identified
Energy (Section 4.7)	Consumption of Raw Materials and Commodities	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Energy consumption, predominantly in the form of gasoline, diesel fuel, and electricity, would be required to operate equipment such as cranes, trucks, tools, and vehicles used to dismantle and remove most Project facilities and reclaim disturbed areas. Backfilling void spaces created by the removal of foundations would require construction aggregate.	Low	Temporary to Short Term	Unavoidable	Local	**ENR-6:** Demolition or removal of all Project related equipment and facilities. **ENR-7:** Recycle all components of the Project.	None identified
Land and Shoreline Use (Section 4.8)	Agriculture	Turbine Option 1 Turbine Option 2 BESSs Substations	Similar to the construction stage	Negligible (farm plan modifications) Low (decreased productivity)	Temporary (brief access modifications) Short Term (seasonal restrictions	Unavoidable	Limited (small area) Regional (decreased productivity)	**LSU-1:** The Applicant would prepare a livestock management plan. **LSU-2:** The Applicant would prepare a dryland farming management plan. **LSU-3:** Arrange for the removal of livestock. **LSU-4:** Confirm that site restoration activities are in alignment with the Applicant's decommissioning plan. **LSU-5:** Requirements for requesting an alternative land use as part of decommissioning.	None identified

Table ES-4c: Summary of Potential Impacts by Component during Decommissioning of the Proposed Action

Section	Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Land and Shoreline Use (Section 4.8)	Agriculture	Solar Arrays	Impacts would be less than those described for the construction stage as dryland wheat production located within the solar array project area would have previously been taken out of management.	Low	Temporary (brief access modifications) Short Term (seasonal restrictions)	Unavoidable	Limited (small area) Regional (decreased productivity)	**LSU-1:** The Applicant would prepare a livestock management plan. **LSU-2:** The Applicant would prepare a dryland farming management plan. **LSU-3:** Arrange for the removal of livestock. **LSU-4**: Confirm that site restoration activities are in alignment with the Applicant's decommissioning plan. **LSU-5:** Requirements for requesting an alternative land use as part of decommissioning.	None identified
Historic and Cultural Resources (Section 4.9)	Eligible Architectural Resources	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Impacts on environmental setting—visual, air quality and noise.	High	Short Term	Probable	Local	**CR-2:** Archaeological and Architectural Resources Mitigation	None identified
Historic and Cultural Resources (Section 4.9)	Traditional Cultural Properties	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Impacts on environmental setting – visual, air quality, noise, and loss of access.	High	Short Term	Probable	Regional	**CR-1:** Traditional Cultural Properties Mitigation	None identified
Historic and Cultural Resources (Section 4.9)	Unknown/ Unidentified Historic and Cultural Resources	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Impacts potentially resulting in the partial or complete loss of significant (previously unidentified) resources.	High	Constant	Unlikely	Local	**CR-2:** Archaeological and Architectural Resources Mitigation	None identified
Visual Aspects, Light and Glare (Section 4.10)	Visual Aspect	Turbine Option 1 Turbine Option 2	Activities would attract attention and would modify the localized existing landscape setting.	Medium	Short Term	Probable	Local	No mitigation identified	None identified
Recreation (Section 4.12)	Recreation – Use	Turbine Option 1 Turbine Option 2	Decommissioning would result in impacts on recreationists who use the Project's study area for recreational activities. Paragliders, hang gliders, and cyclists would be affected by the decommissioning of the Project.	Low	Short Term	Unavoidable	Local	**R-1:** Work with DNR and Benton County to identify new recreational activities and/or improve existing recreational activities within Lease Boundary (e.g., multi-use trails). **R-3:** Work with the local and regional clubs to provide and maintain a plan to keep recreationists safe.	None identified

Table ES-4c: Summary of Potential Impacts by Component during Decommissioning of the Proposed Action

Section	Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Recreation (Section 4.12)	Recreation – Use	Solar Arrays	Decommissioning of the Sellards Solar Field would restrict access to a parcel of DNR-administered land within the Lease Boundary, resulting in a high impact.	High	Short Term	Unavoidable	Limited	**R-1:** Work with DNR and Benton County to identify new recreational activities and/or improve existing recreational activities within Lease Boundary (e.g., multi-use trails).	None identified
Recreation (Section 4.12)	Recreation – Recreational Experience	Turbine Option 1 Turbine Option 2 Solar Arrays	Indirect impacts related to visual resources and noise could occur at recreation sites. Impacts on noise receptors would occur locally, while visual impacts would occur at a regional spatial extent.	High	Short Term	Unavoidable	Regional	**R-2:** Provide informational boards, as approved by DNR and EFSEC, at viewpoints associated with scenic areas of interest.	None identified
Recreation (Section 4.12)	Recreation – Public Health and Safety	Turbine Option 1 Turbine Option 2 Solar Arrays	The Project's potential to affect the health and safety of recreationists using the area for paragliding, hang gliding, or biking would result in a medium impact.	Medium	Short Term	Unavoidable	Regional	**R-3:** Work with the local and regional clubs to provide and maintain a plan to keep recreationists safe	None identified
Public Health and Safety (Section 4.13)	Fire (Worker Health and Safety)	Turbine Option 1 Turbine Option 2	Combustible materials and lubricants are contained in the nacelle of the turbines. Diesel-powered generators may be used during decommissioning. Use of these materials could pose a fire risk.	Medium	Temporary	Feasible	Limited	No mitigation identified	None identified
Public Health and Safety (Section 4.13)	Fire (Worker Health and Safety)	Solar Arrays Substations BESSs	Fire resulting from decommissioning BESSs, solar arrays, and substations is unlikely, but wildfire risk in the area is considered high.	Medium	Temporary	Unlikely	Limited	No mitigation identified	None identified
Public Health and Safety (Section 4.13)	Smoke and Haze (Public Health)	Turbine Option 1 Turbine Option 2	If a fire were to occur during turbine decommissioning, indirect impacts could include smoke or haze, and a potential reduction in emergency response services.	Medium	Temporary	Feasible	Regional	No mitigation identified	None identified
Public Health and Safety (Section 4.13)	Smoke and Haze (Public Health)	Solar Arrays Substations BESSs	If a fire were to occur during decommissioning of the solar arrays, substations, or BESSs, indirect impacts could include smoke or haze, and a potential reduction in emergency response services.	Medium	Temporary	Unlikely	Regional	No mitigation identified	None identified
Public Health and Safety (Section 4.13)	Release of Hazardous Materials	Turbine Option 1 Turbine Option 2 Solar Arrays Substations BESSs	Project elements include small amounts of oil, which could be released during decommissioning.	Medium	Temporary	Unlikely	Limited	No mitigation identified	None identified

Table ES-4c: Summary of Potential Impacts by Component during Decommissioning of the Proposed Action

Section	Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Transportation (Section 4.14)	Vehicular Traffic	Turbine Option 1 Turbine Option 2	Decommissioning will require the removal and transportation of the dismantled pieces of the turbines, expected to be smaller than the pieces that arrived during the construction stage. The increase in traffic volumes is not expected to decrease level of service or cause a decline in roadway safety.	Low	Short Term	Unavoidable	Regional	**TR-1:** Daily transport communication, including emergency numbers. **TR-2:** Operation Lifesaver safety presentation and training. **TR-3:** Traffic Analysis. **TR-4:** Railroad crossing and grade change survey. **TR-5:** Traffic and Safety Management Plan.	None identified
Transportation (Section 4.14)	Vehicular Traffic	Solar Arrays	Decommissioning will require the removal and transportation of the solar arrays and supporting infrastructure. The increase in traffic volumes is not expected to decrease level of service or cause a decline in roadway safety.	Low	Short Term	Unavoidable	Local	**TR-1:** Daily transport communication, including emergency numbers. **TR-2:** Operation Lifesaver safety presentation and training. **TR-3:** Traffic Analysis. **TR-4:** Railroad crossing and grade change survey. **TR-5:** Traffic and Safety Management Plan.	None identified
Transportation (Section 4.14)	Vehicular Traffic	BESSs Substations	Decommissioning will require the removal and transportation of the BESSs and substations. The increase in traffic volumes is not expected to decrease level of service or cause a decline in roadway safety.	Low	Short Term	Probable	Local	**TR-1:** Daily transport communication, including emergency numbers. **TR-2:** Operation Lifesaver safety presentation and training. **TR-3:** Traffic Analysis. **TR-4:** Railroad crossing and grade change survey. **TR-5:** Traffic and Safety Management Plan.	None identified
Public Services and Utilities (Section 4.15)	Municipal Solid Waste	Turbine Option 1 Turbine Option 2 Solar BESSs Substations	After dismantling of the facility, high-value components would be removed for scrap value. The remaining materials would be reduced to transportable size and removed from the site for disposal. Existing facilities would maintain capacity to receive the Project's non-recyclable waste and continue to serve their communities.	Low	Constant	Unavoidable	Local to Regional	**ENR-7:** Recycle all applicable components. **PSU-1:** Use of a licensed waste disposal facility.	None identified

Table ES-4c: Summary of Potential Impacts by Component during Decommissioning of the Proposed Action

Section	Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Socioeconomics (Section 4.16)	Housing Availability	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	The majority of construction workers would be sourced locally; however, the Project's construction would require the temporary and short-term relocation of construction workers into the region.	Negligible to Low	Temporary to Short Term	Feasible	Regional	**Socio-ec-1:** Updated housing analysis to confirm temporary or short-term availability.	None identified
Socioeconomics (Section 4.16)	Wellbeing	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Decommissioning of the Project would restore property tax revenues for Benton County and the Tax Area to pre-Project conditions as the Project's added value would be removed from the parcels that make up the Lease Boundary's valuation. For example, smaller collections would impact operational budgets for schools, school districts, and fire stations within Benton County and the Tax Area.	Medium	Long Term	Feasible	Regional	No mitigation identified	None identified

Notes:

(a) Components were combined in the same cell if they received the same impact ratings for the identified topic.

(b) Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.

(c) Mitigation measures listed here are additional actions that EFSEC could impose to further reduce the impacts. See Section 4.1 for details.

(d) Significant unavoidable impacts are those that would remain even after all identified additional mitigation measures have been required by EFSEC.

Applicant = Horse Heaven Wind Farm, LLC; BESS = battery energy storage system; DNR = Washington State Department of Natural Resources; EFSEC = Washington Energy Facility Site Evaluation Council; SWPPP = stormwater pollution prevention plan; TAC = Technical Advisory Committee; TUSFWS = U.S. Fish and Wildlife Service; WDFW = Washington Department of Fish and Wildlife; ZOI = zone of influence

1.0 CHAPTER 1 – PROJECT BACKGROUND

1.1 Introduction

Horse Heaven Wind Farm, LLC (the Applicant) is proposing to construct and operate the Horse Heaven Wind Farm (Project, or Proposed Action) in unincorporated Benton County, Washington, within the Horse Heaven Hills area. At its closest point, the Project is located approximately 4 miles south/southwest of the city of Kennewick and the larger Tri-Cities urban area, along the Columbia River. A map showing the Project area is presented in **Figure 1-1**.

1.2 Proposed Project

1.2.1 Project Overview

The Project would consist of a renewable energy generation facility that would have a nameplate energy generating capacity of up to 1,150 megawatts (MW) for a combination of wind and solar facilities, as well as a battery energy storage system (BESS). The number of turbines and extent of solar arrays would depend on the final turbine models and/or solar modules selected, as well as the final array layout options. Other Project components would include underground and overhead electrical collection lines, underground communication lines, new Project substations, access roads, operations and maintenance (O&M) facilities, meteorological towers, and control houses.

The Project's electrical system would consist of three key elements that would be connected to the turbines and solar facilities in any configuration combination: 1) an electrical collector system, which would collect energy generated at the turbines and solar array, transform the voltage using a pad mounted transformer, and deliver the energy via cables to 2) the Project substations, which would deliver it into the regional transmission system; and 3) BESSs[1], which would be capable of storing and later deploying energy generated by the Project to the grid.

Power generated by the Project would be transmitted to existing Bonneville Power Administration (BPA) transmission lines via two interconnections. Power could interconnect to the planned BPA 230-kilovolt (kV) Bofer Canyon Substation. Power could also interconnect to the planned BPA 500-kV Webber Canyon Substation. Power would be transmitted to a purchaser under a contract with the Applicant. Such power purchasers could include any of the local or regional utilities, or commercial and industrial power users, with potential off-takers having distribution outside of Washington state.

1.2.2 The Applicant

The Applicant is Horse Heaven Wind Farm, LLC. Scout Clean Energy LLC (Scout) is the indirect owner of 100 percent of the Project. Scout intends to build, own, and operate the Project.

Scout is a renewable energy development company headquartered in Boulder, Colorado. Scout owns and operates more than 800 MW of onshore wind-energy-generating facilities and is actively developing a 4,000-MW portfolio of onshore wind, solar photovoltaic (PV), and battery storage projects across 13 U.S. states. Scout is a portfolio company of Quinbrook Infrastructure Partners, a specialist investment manager focused exclusively on lower carbon, renewable energy infrastructure investment and operational asset management in the United States, United Kingdom, and Australia.

[1] The Applicant indicated in the ASC that there is the potential for fewer than three BESS to be constructed but has requested analysis for all the components and distinct parts as presented in Table 2.1-1 of the ASC.

This Page Intentionally Left Blank

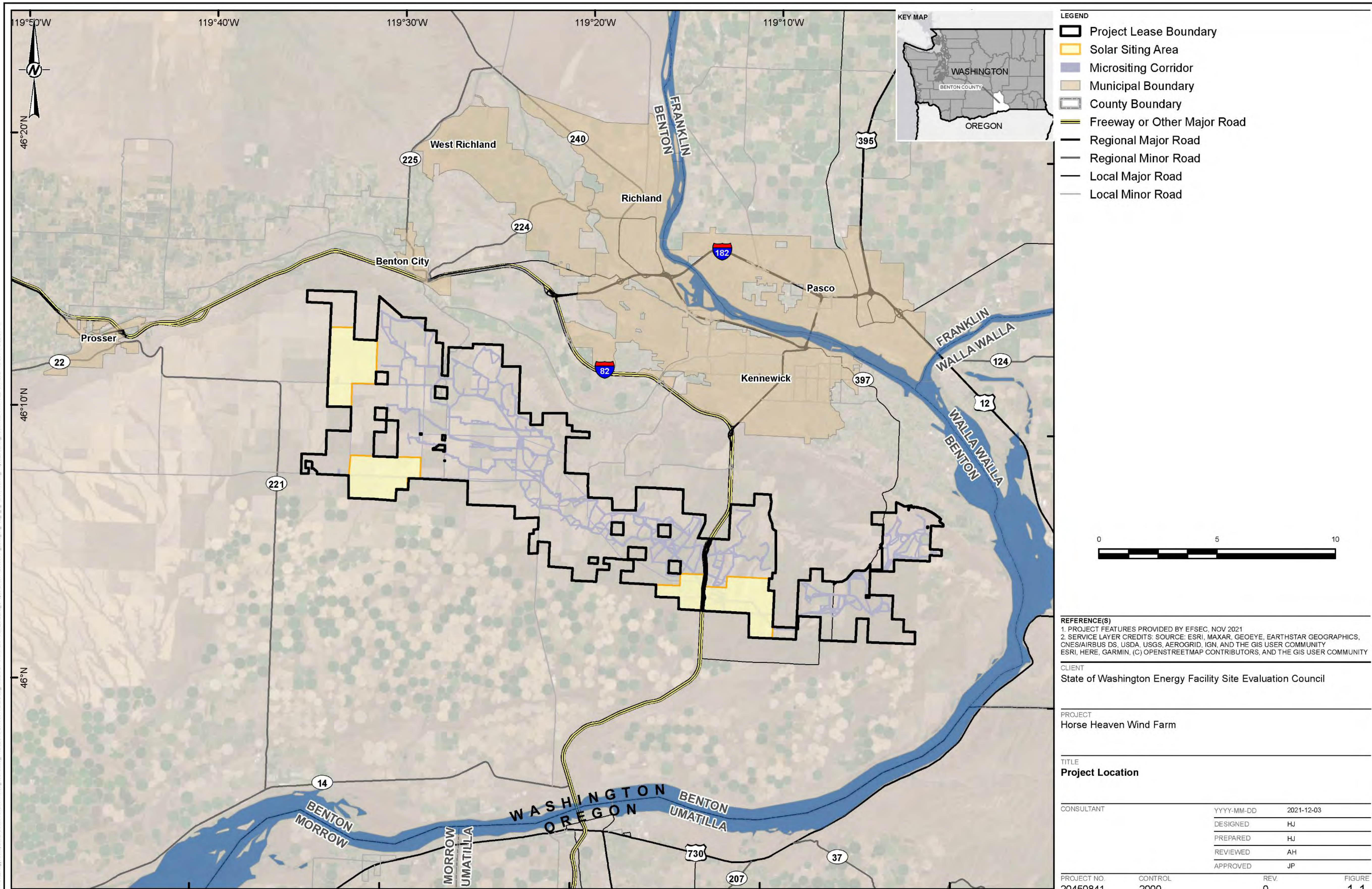


Figure 1-1: Project Location

1.2.3 Energy Facility Site Evaluation Council Role and Responsibilities

The Washington State Energy Facility Site Evaluation Council (EFSEC) is the state agency responsible for evaluating and making recommendations to the governor on approval or denial of certain major energy facilities in Washington. This includes voluntary applicants such as the proposed facility. Project review is conducted under the requirements of Revised Code of Washington (RCW) 80.50 and associated regulations. The proposed Project falls under EFSEC's jurisdiction because RCW 80.50 allows Scout to choose to apply for site certification through EFSEC (RCW 80.50.060 (2)). The Project meets the definition of an "alternative energy resource" that includes "wind" and "solar" (RCW 80.50.020(1)(a)-(b)).

EFSEC is a council comprising the directors of five state agencies (or their designees) and a chairperson appointed by the governor. The state agencies with designees on EFSEC are:

- Department of Commerce
- Department of Ecology (Ecology)
- Department of Fish and Wildlife (WDFW)
- Department of Natural Resources (DNR)
- Utilities and Transportation Commission (UTC)

The directors of other specified state agencies may, at their discretion, choose to participate as council members for a particular proposal before EFSEC. For this Project, the Department of Agriculture has designated a member to EFSEC. Counties, cities, and port districts where a potential project is located also appoint members to EFSEC. For this proposed Project, Benton County Board of Commissioners has appointed a member.

EFSEC's review of the proposal is guided by RCW 80.50.010 which states the following:

- The legislature finds that the present and predicted growth in energy demands in the state of Washington requires a procedure for the selection and use of sites for energy facilities and the identification of a state position with respect to each proposed site. The legislature recognizes that the selection of sites will have a significant impact upon the welfare of the population, the location and growth of industry and the use of the natural resources of the state.
- It is the policy of the state of Washington to reduce dependence on fossil fuels by recognizing the need for clean energy in order to strengthen the state's economy, meet the state's greenhouse gas reduction obligations, and mitigate the significant near-term and long-term impacts from climate change while conducting a public process that is transparent and inclusive to all with particular attention to overburdened communities.
- The legislature finds that the in-state manufacture of industrial products that enable a clean energy economy is critical to advancing the state's objectives in providing affordable electricity, promoting renewable energy, strengthening the state's economy, and reducing greenhouse gas emissions. Therefore, the legislature intends to provide the council with additional authority regarding the siting of clean energy product manufacturing facilities.
- It is the policy of the state of Washington to recognize the pressing need for increased energy facilities, and to ensure through available and reasonable methods that the location and operation of all energy facilities

and certain clean energy product manufacturing facilities will produce minimal adverse effects on the environment, ecology of the land and its wildlife, and the ecology of state waters and their aquatic life.

After its evaluation of the proposed Project is complete, EFSEC will submit a recommendation to the governor. If EFSEC recommends approval of the proposed Project, EFSEC will submit a draft Site Certification Agreement (SCA) for the governor's signature. An approved SCA typically includes conditions that the Applicant must meet during Project construction, operation, and eventual decommissioning. Within 60 days of receipt of EFSEC's recommendation, the governor may approve the Project, reject the Project, or direct EFSEC to reconsider the SCA. If an Application for Site Certification (ASC) is denied, the proposed project cannot be constructed and operated.

1.3 Purpose of Proposed Action

The purpose of the proposed Project is to provide 1,150 MW of renewable energy using wind energy and solar energy. The Applicant selected the Project location because it meets the following feasibility and viability criteria:

- Commercially viable above-average wind speeds
- Sufficient flat area and solar irradiance to site solar PV panels
- Close proximity to existing transmission lines with sufficient available capacity to carry the Project's output to the grid
- Area landowners are willing to participate in the Project and have sufficient undivided acreage to support a commercial renewable energy facility.

1.4 State Environmental Policy Act Review Process

During the site certification process, EFSEC functions as the "lead agency" responsible for complying with the Washington State Environmental Policy Act (SEPA) procedural requirements (Washington Administrative Code [WAC] 463-47). EFSEC prepared this Draft Environmental Impact Statement (Draft EIS) with the assistance of an independent consultant, as provided for in WAC 463-47-090(2)(b). EFSEC and its independent consultant reviewed all Applicant-prepared information and analyses before inclusion in this Draft EIS. EFSEC staff and EFSEC's consultant also supplemented the Applicant-prepared information and analyses during preparation of this Draft EIS.

1.4.1 EFSEC Public Engagement

On March 9, 2021, EFSEC issued an announcement for a Public Informational Meeting and Land Use Consistency Hearing on the EFSEC website and mailed the announcement to those on the interested parties distribution list, tribes, and EFSEC's general distribution list. Public Notice was published in Tri-City Herald for the SEPA Scoping on May 12, 2021 and the Scoping Notice was posted to the SEPA Register on May 14, 2021. The Applicant's submittal included a request for expedited processing under WAC 463-43. EFSEC further identified that copies of the application were available upon request and that a virtual public information meeting would be conducted at a later date. On March 29, 2021, the Applicant withdrew its request for expedited processing.

An informational public meeting and land use consistency hearing were held on March 30, 2021, to inform the public about the Project, receive public comments, and review information regarding the Project's consistency and compliance with land use plans and zoning ordinances.

1.4.1.1 EFSEC Public Information Meeting

In accordance with WAC 463-26-025, on March 30, 2021, EFSEC held a virtual public information meeting to explain the process that would be followed for review of the proposal. Members of the public were given an opportunity to provide oral and written comments.

1.4.1.2 EFSEC Land Use Consistency Hearing

In accordance with RCW 80.50.090(2), on March 30, 2021, EFSEC held a virtual land use consistency hearing to determine whether the proposed Project is consistent and in compliance with city, county, and regional land use plans or zoning ordinances. The land use consistency determination, EFSEC Order No. 883, was issued May 17, 2022.

1.4.2 Scoping

1.4.2.1 State Environmental Policy Act Scoping Notice

On May 11, 2021, EFSEC staff issued the *SEPA Determination of Significance and Request for Comments on Scope of Environmental Impact Statement for the Horse Heaven Wind Farm Project* (the Scoping Notice) requesting comments on the Project EIS scope from agencies, affected tribes, and members of the public. The Scoping Notice included a summary of the Proposed Action and information on the scoping process for preparation of an EIS. The Scoping Notice requested that all scoping comments be received by EFSEC by June 10, 2021.

The Scoping Notice identified the following environmental elements for detailed analysis in the EIS:

- Wildlife and Habitat
- Visual and Aesthetic
- Land Use

The following environmental elements were identified in the Scoping Notice as requiring additional information before determining the level of analysis in the EIS:

- Air
- Water (wetlands, water quality, and water resources)
- Plants
- Energy and Natural Resources
- Environmental Health
- Noise
- Light and Glare
- Historic Resources
- Cultural Resources

1.4.3 Draft Environmental Impact Statement Comment Period and Public Meetings

This Draft EIS is available for public review. This Draft EIS's comment period is 45 days, and extends through February 1, 2023. A public comment meeting/hearing for this Draft EIS will occur during the 45-day comment period. EFSEC will notice the public meeting/hearing in accordance with WAC 463-18-050 and WAC 197-11-510.

1.4.4 Decisions to Be Made

This Draft EIS is being distributed to the public and other interested persons for comment. Distribution of the Draft EIS provides the public with information about the proposed Project and its environmental effects, while also allowing an opportunity for meaningful public participation and comment. EFSEC staff and its independent consultant will review and respond to comments received on the Draft EIS. Those comments and the responses will be identified in a Final EIS.

The Final EIS will inform the Council's decision on whether to recommend approval or denial of the proposed Project to the governor, and the Final EIS will inform the governor's ultimate decision. If EFSEC determines the Project should be recommended for approval, it will develop a recommendation and a draft SCA to be signed by the governor.

The SCA would contain all requirements and any other conditions the Applicant must meet for construction and operation throughout the Project life, and for eventual decommissioning of the Facility. If EFSEC determines the Project should not be recommended to the governor for approval, the recommendation will explain the EFSEC's decision. The governor has 60 days to consider EFSEC's recommendation and can take one of the following actions:

1. Approve EFSEC's recommendation to approve the application and execute the draft SCA.
2. Approve EFSEC's recommendation to deny the application and reject the application
3. Direct EFSEC to reconsider certain aspects of the Project and draft SCA.

1.5 Federal, State, and Local Permits and Approvals

For facilities under its jurisdiction, EFSEC's governing statutes and rules preempt all aspects of the certification and regulation of energy facilities approved under RCW 80.50. As a result, state and local regulatory permits, requirements, and standards may not apply to the proposed Project. **Table 1-1** lists the generally applicable state and local permits and approvals that would apply if the Project were not under EFSEC's jurisdiction.

Table 1-1: State (or Federally Delegated) and Local Permits and Approvals

Permit or Approval	Agency/Statute and/or Regulation
State	
Water Quality Permits	Ecology Section 401 of the CWA
Authorization to Use State-owned Lands	DNR RCW 79.36
State Protected Species	WDFW WAC 220-610, State species status and protections WAC 232-23, Classification of wildlife species, including "Priority Habitats and Species" WDFW Wind Guidelines (2009) RCW 77, Hydraulic Code

Table 1-1: State (or Federally Delegated) and Local Permits and Approvals

Permit or Approval	Agency/Statute and/or Regulation
Access Permit, Utility Permit	WSDOT WAC 468-34-100
Oversize and Overweight Permit	WSDOT WAC 468-38-075
Electrical Construction Permit	WDLI WAC 296-746A, Washington Department of Labor and Industries Safety Standards: Installing Electrical Wires and Equipment – Administration Rules
Noise Control	RCW 70.107, Noise Control WAC 173-58, Sound Level Measurement Procedures WAC 173- 60, Maximum Environmental Noise Levels WAC 463-62-030, Noise Standards
Construction Stormwater General Permit	Ecology CWA (42 U.S.C. 1251-15; CFR 923-930) RCW 90.48, establishes general stormwater permits for Ecology under the Water Pollution Control Act WAC 173-201A, Water Quality Standards for Surface Waters of the State of Washington
Sand and Gravel General Permit	Ecology WAC 173-201A, Water Quality Standards for Surface Waters of the State of Washington WAC 173-204, sediment management standards WAC 173-226, procedures for issuing general permits
Air Permits: New Source Review, Portable Air Containment Sources -Notice of Construction (NOC), and Notice of Intent (NOI)	Benton Clean Air Agency (BCAA) Clean Air Act WAC 463-78 and 173-400 BCAA
Shoreline Substantial Development Permit	Ecology WAC 173-18, Shoreline Management Act, Streams and Rivers Constituting Shorelines of the State WAC 173-22, Adoption of Designations of Shorelands and Wetlands Associated with Shorelines of the State RCW 90.58.140[9]
State Environmental Policy Act (SEPA)	EFSEC RCW 43.21C, Washington Environmental Policy Act WAC 197-11, Washington Department of Ecology SEPA Rules BCC 6.35
Archaeological Sites and Resources, Archaeological Site Alteration and Excavation Permit	DAHP RCW 27.53, Archaeological Sites and Resources
Local	
Conditional Use Permit (CUP)	Benton County Planning and Building Development BCC 11.17.017
Critical Areas Regulations	Benton County Planning and Building Development RCW 36.70A WAC 365-190-(080-130) WAC. 365-195, Best Available Science Section WAC 365-196-485 and WAC 365-196-830, Procedures BCC 15.02.080

Table 1-1: State (or Federally Delegated) and Local Permits and Approvals

Permit or Approval	Agency/Statute and/or Regulation
Building Permits	Benton County Planning and Building Development BCC 11.42.040
Special Permit - General	Benton County Fire Marshal BCC 3.16.032 International Fire Code (2015 Edition)
Oversized Load Permit	Benton County Department of Public Works RCW 46.44.090
Road Approach Permit	Benton County Department of Public Works RCW 36.75.130
ROW Encroachment Permit	Benton County Department of Public Works RCW 36.75.130
Franchise Agreement	Benton County Department of Public Works RCW 36.55.040

Notes:
BCC = Benton County Code; BCAA = Benton Clean Air Code; CFR = Code of Federal Regulations; CUP = Conditional Use Permit; CWA = Clean Water Act; DAHP = Washington Department of Archaeology and Historic Preservation; DNR = Washington Department of Natural Resources; Ecology = Washington Department of Ecology; EFSEC = Energy Facility Site Evaluation Council; NOC = Notice of Completion; NOI = Notice of Intent; RCW = Revised Code of Washington; ROW = right-of-way; SEPA = Washington State Environmental Policy Act; U.S.C. = United States Code; WAC = Washington Administrative Code; WDFW = Washington Department of Fish and Wildlife; WDLI = Washington Department of Labor and Industries; WSDOT = Washington State Department of Transportation

1.6 Organization of Draft EIS

This Draft EIS is organized into 9 separate chapters and has multiple technical appendices. Chapter 3 and Chapter 4 are further subdivided into 16 sections addressing specific resource topics. **Table 1-2** presents additional details on the organization of the Draft EIS chapters.

Table 1-2: Draft EIS Organizational Structure

Document Contents	Chapter Description
Chapter 1 Project Background and Purpose and Need	Chapter 1 provides background information on the proposed Project and states the Project's purpose and need. The chapter also outlines the steps undertaken to date in the SEPA review process, describes public, agency, and tribal involvement to date, and identifies federal, state, and local permits that would apply to the proposed facility.
Chapter 2 Proposed Action and Alternatives	Chapter 2 provides detailed descriptions of the construction, operation, maintenance, and decommissioning activities proposed for the facility. It explains the Proposed Action, provides an evaluation of alternatives to the Proposed Action, and describes the No Action Alternative. Applicant commitments and proposed best management practices are collated and presented here.
Chapter 3 Affected Environment	Chapter 3 has been subdivided into separate sections that describe the existing environment for 15 separate resources.
Chapter 4 Impacts, and Mitigation Measures	Chapter 4 focuses on impacts that may occur to environmental resources from the construction, operation, and decommissioning of the proposed facility.

Table 1-2: Draft EIS Organizational Structure

Document Contents	Chapter Description
Chapter 5 Cumulative Impacts	Chapter 5 describes potential cumulative impacts of the Proposed Action when combined with potential impacts from other past, present, and reasonably foreseeable developments that could occur within similar spatial and temporal settings.
Chapter 6 References	Chapter 6 provides references to the literature cited throughout the Draft EIS.
Chapter 7 List of Contributors	Chapter 7 identifies those who contributed to the preparation of the Draft EIS.
Chapter 8 Glossary	The glossary defines many of the terms used in the Draft EIS.
Chapter 9 Distribution List	The distribution list identifies organizations and individuals who were sent an electronic copy of the Draft EIS.

This Page Intentionally Left Blank

2.0 CHAPTER 2 – PROPOSED ACTION AND ALTERNATIVES

This chapter describes the Horse Heaven Wind Farm (Project, or Proposed Action) proposed by Horse Heaven Wind Farm, LLC[1] (Applicant) and the alternatives to the Proposed Action that are being considered in this Draft Environmental Impact Statement (EIS). Section 2.1 summarizes the proposed facility site, Proposed Action, and considerations concerning the construction, operation, and decommissioning stages of the Project. Unless otherwise noted, the information presented in Section 2.1 is sourced from the Application for Site Certification (ASC) (Horse Heaven Wind Farm, LLC 2021) and summarizes the Applicant-committed measures for the Project. Section 2.2 describes the alternatives considered for evaluation.

2.1 Description of the Proposed Action

The Applicant is proposing to construct a renewable energy generation facility that would be located in the Horse Heaven Hills area of Benton County, Washington. The Project would have a nameplate generating capacity[2] of up to 1,150 megawatts (MW) and would utilize both wind turbines and solar photovoltaic panels to convert energy from the wind and sun into electric power. The power would then be either directly transferred to the electric power grid or stored in up to three[3] battery energy storage systems (BESSs). The final number of turbines and the extent of solar arrays used for the Project would not total more than 244 turbines and three solar arrays. The final number of turbines and solar arrays would depend on the turbine models and solar modules selected and selection of a final array layout.

2.1.1 Proposed Facility Site

The Project's Lease Boundary incorporates all of the parcels in which the Applicant has executed a lease to construct the turbines, solar arrays, and associated facilities. The Lease Boundary encompasses approximately 72,428 acres and is depicted in **Figure 2-1**.

The Project's Wind Energy Micrositing Corridor encompasses 11,850 acres within the Lease Boundary and consists of the areas where the turbines and supporting facilities would be sited during the final design. The Project's Solar Siting Areas, which are three locations under consideration for the proposed solar arrays, encompass 10,755 acres within the Lease Boundary. Proposed disturbance areas are shown in **Figure 2-2**. The Micrositing Corridor and the Solar Siting Areas are larger than the Project's permanent, designed footprint of the individual components to allow minor rerouting to optimize the design and avoid any sensitive resources discovered during the final design and pre-construction process.

---

[1] An entity of Scout Clean Energy.

[2] Nameplate generating capacity is the amount of electricity a generator can produce when running at its maximum designed output.

[3] The Applicant indicated in the ASC that there is the potential for fewer than three BESS to be constructed but has requested analysis for all the components and distinct parts as presented in Table 2.1-1 of the ASC.

This Page Intentionally Left Blank

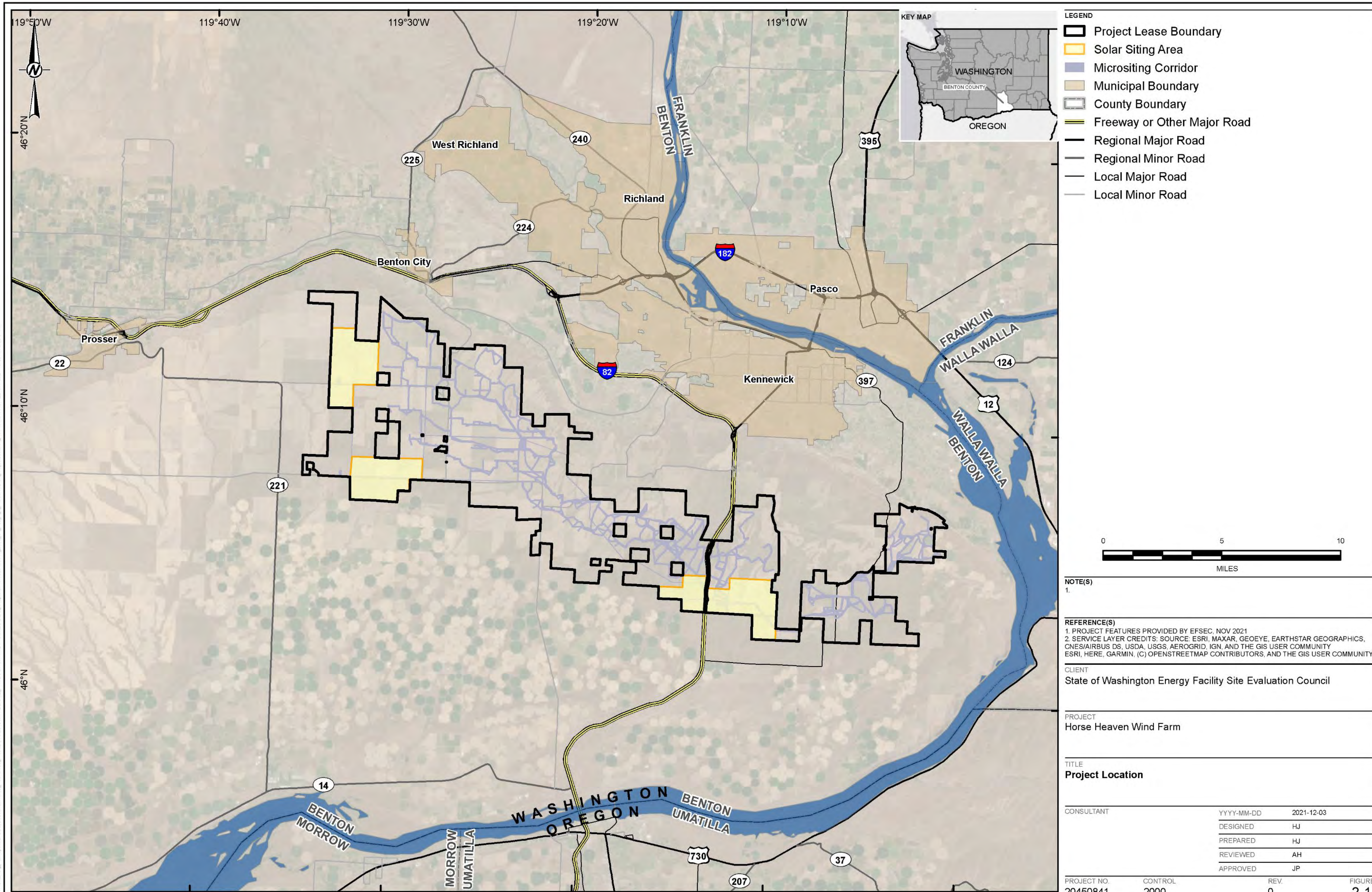


Figure 2-1: Project Location

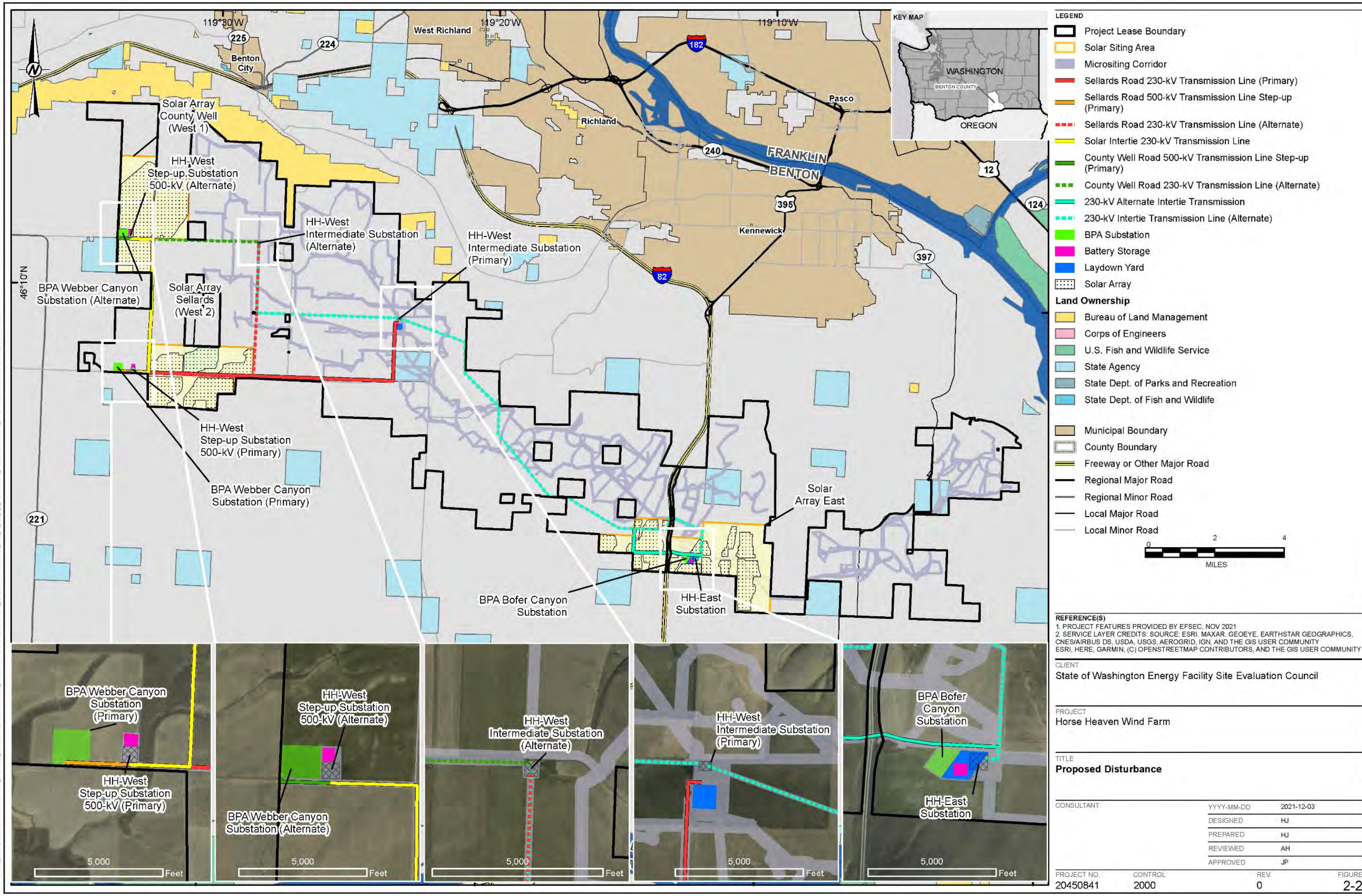


Figure 2-2: Proposed Disturbance

Much of the Project's Lease Boundary is privately owned; however, five Washington Department of Natural Resources parcels that are state trust lands fall within the Lease Boundary. Four of these parcels include proposed turbines and supporting facilities, and one could be crossed by the proposed transmission line and is a possible site for a Project solar component. Additionally, portions of the Lease Boundary may currently be enrolled in the U.S. Department of Agriculture's Conservation Reserve Program. The Project would be located on land designated as agricultural per the Growth Management Act as part of the Benton County Comprehensive Plan and outside any Urban Growth Area (Benton County 2021).

The Applicant's ASC seeks authorization for up to 244 turbine locations and a maximum of three solar arrays, with all possible turbine locations and solar arrays cumulatively reviewed to analyze potential resource impacts. Fewer turbines and solar arrays may be constructed for the Project and still achieve the nameplate generating capacity.

The maximum number of turbines and maximum turbine height carried forward for analysis as components of the Proposed Action are reflected in Turbine Option 1 and Turbine Option 2, as summarized in **Table 2-1**. Option 1 is shown in **Figure 2-3**, and Option 2 is shown in **Figure 2-4**. The final number and location of turbines within the proposed Wind Energy Micrositing Corridor would reflect the final engineering design, model selection, and any additional avoidance and mitigation identified in this Draft EIS. The specific model used would depend on the commercial availability and technology at the time of construction. The number of turbines would not exceed 244, and the maximum turbine height (at blade tip) would not exceed 671 feet. This Draft EIS assumes that the road disturbance associated with Turbine Option 1 and Turbine Option 2 would be identical.

Table 2-1: Proposed Action - Wind Turbines

	Turbine Option 1	**Turbine Option 2**
Wind Turbines	244 turbines up to a maximum blade tip height of 499 feet[(a)]	150 turbines up to a maximum blade tip height of 671 feet[(a)]
Temporary Disturbance	1,070 acres	
Permanent Disturbance	30 acres	
Lease Boundary	72,428 acres	

Source: ASC Table 2.3-1 (Horse Heaven Wind Farm, LLC 2021)
Note:
(a) As proposed in the ASC

This Page Intentionally Left Blank

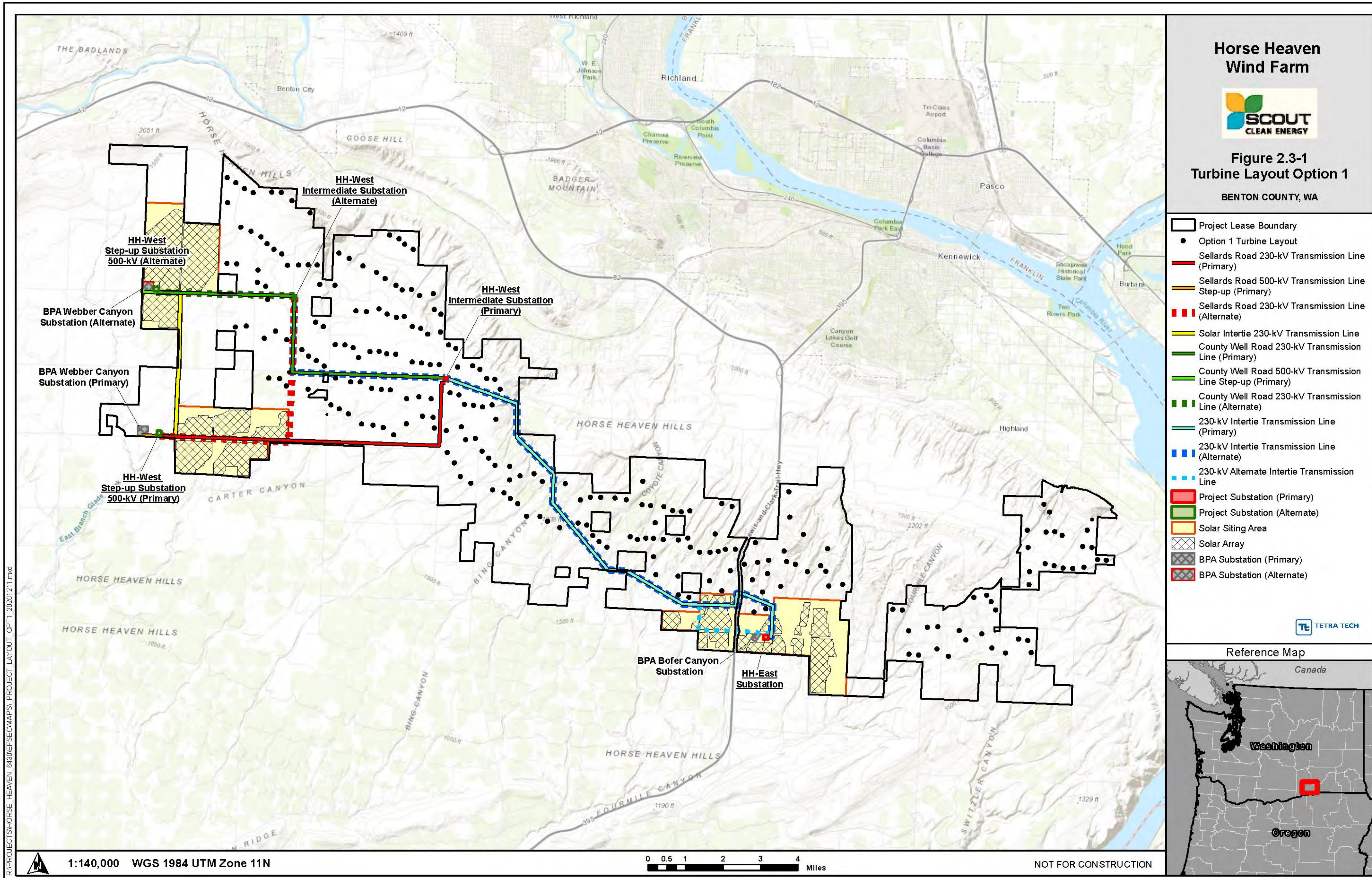


Figure 2-3: Turbine Layout - Option 1 (Horse Heaven Wind Farm, LLC 2021)

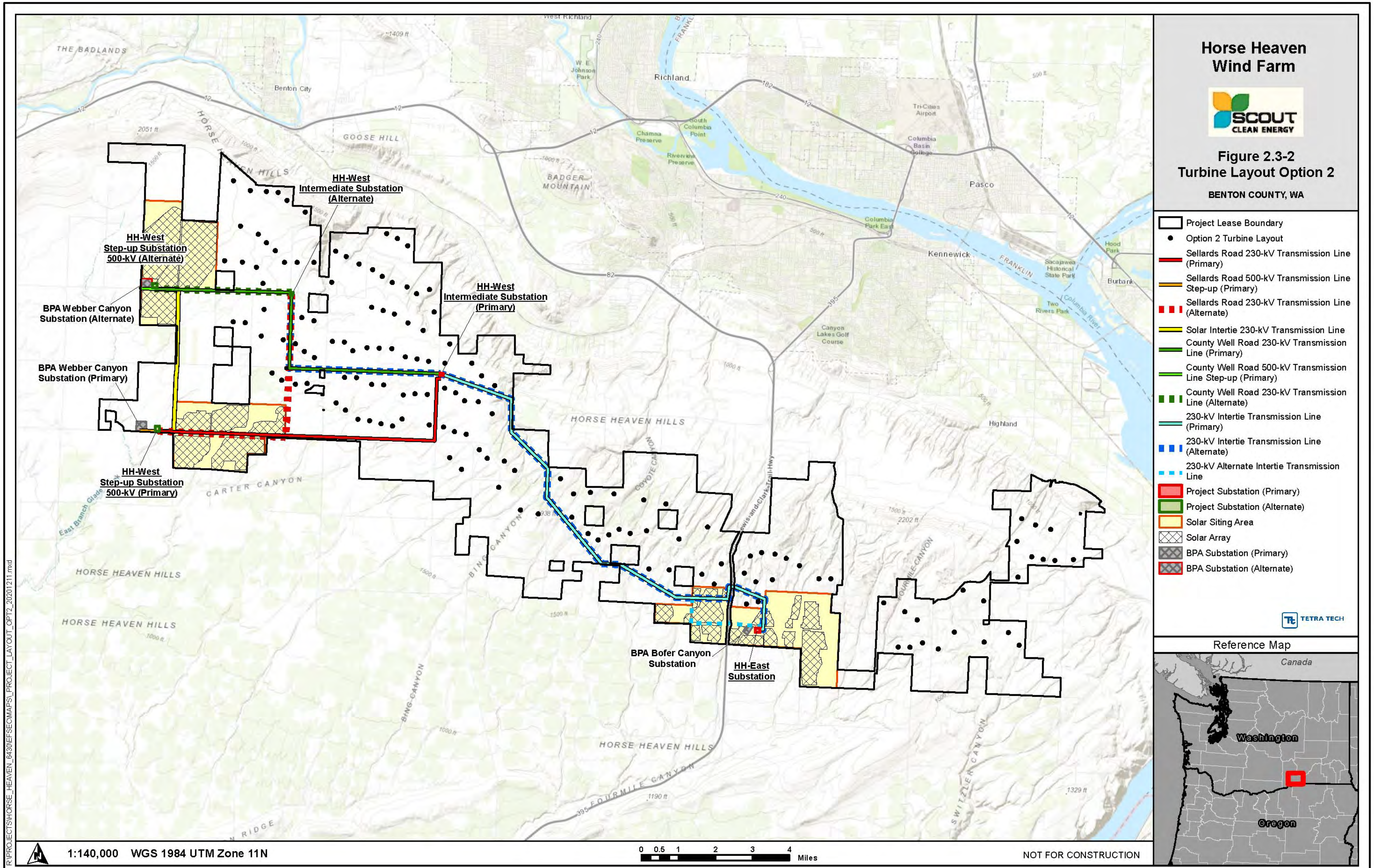


Figure 2-4: Turbine Layout - Option 2 (Horse Heaven Wind Farm, LLC 2021)

The wind energy components would be combined with the solar arrays, BESSs, and other infrastructure supporting solar and wind energy, and are summarized in **Table 2-2**. The disturbance, including supporting infrastructure, would only occur within the disturbance areas proposed in the ASC. The disturbance associated with the Project would not total more than 2,957 acres of temporary disturbance and 6,869 acres of permanent disturbance. The combination of components selected would not have a greater disturbance footprint than allowed for in the site certification agreement (if approved) and must satisfy all pre-construction conditions.

The Draft EIS describes potential impacts specific to each proposed turbine option, solar array, substation, and BESS where the information was available in the ASC and supporting documents for individual components. Potential impacts related to the Project's components are generalized for the analysis of the Proposed Action when impacts are common within the Micrositing Corridor or Solar Siting Areas

Table 2-2: Proposed Action - Solar Siting and Supporting Infrastructure for Wind and Solar Facilities[a]

	Temporary Disturbance (acres)	Permanent Disturbance (acres)
Solar Arrays in Fields		
East Solar Field	37	1,994
County Well Solar Field	18	2,641
Sellards Solar Field	22	1,935
Total Disturbance Acreage of Solar Arrays in Fields	**77**	**6,570**
BESSs[4]		
BESS adjacent to the Bofer Canyon - HH-East Substation		
BESS adjacent to the Primary HH-West Step-Up Substation	1	18
BESS adjacent to the Alternate HH-West Step-Up Substation		
Substations		
HH-East Substation		
Primary HH-West Intermediate Substation		
Alternate HH-West Intermediate Substation	3	38
Primary HH-West Step-Up Substation[b]		
Alternate HH-West Step-Up Substation[b]		
Supporting Infrastructure		
Roads,[c] Crane Paths, Laydown Yards, O&M Facilities, Met Towers	870.9	218.5
Collector Lines		
Overhead	0.5	0.01
Underground	787	0.06
Transmission Lines		
230 kV	235	0.02
500 kV	12	<0.01
Total Disturbance Acreage of Supporting Infrastructure	**1,905.4**	**218.6**

Source: Horse Heaven Wind Farm, LLC 2021
Note:
[a] As proposed in the ASC, Table 2.1-1
[b] May alternatively be used as the HH-West Alternate Solar Substation (ASC Table 2.3-2) to support solar operations, depending on the location where the Bonneville Power Administration elects to construct the Webber Canyon Substation.
[c] Includes new access roads and road modification (turning radius widening). This Draft EIS assumes that road disturbance would be identical under both Option 1 and Option 2.
ASC = Application for Site Certification; BESS = battery energy solar station; HH = Horse Heaven; kV = kilovolt; met tower = meteorological tower; O&M = operations and maintenance

The temporary and permanent disturbances, calculated independently using spatial data provided by the Applicant, are provided for the Wind Energy Micrositing Corridor for Turbine Option 1 and Solar Siting areas in **Table 2-3**. Temporary and permanent disturbance acreage was not provided for Turbine Option 2 in the ASC.

[4] The Applicant indicated in the ASC that there is the potential for fewer than three BESSs to be constructed but has requested analysis for all the components and distinct parts as presented in Table 2.1-1 of the ASC.

Turbine Option 2 includes fewer turbines within the same corridors as Turbine Option 1, and the requirements for roads and collector lines for Turbine Option 2 are expected to be similar to or less than the requirements for Turbine Option 1. Therefore, the temporary and permanent disturbance acreage for Turbine Option 1 is conservatively used as an upper bound for expected disturbance from Turbine Option 2. Disturbance includes the supporting infrastructure required for each component.

Table 2-3: Temporary and Permanent Disturbance for Turbine Option 1 and Solar Siting Areas

Habitat Type	Micrositing Corridor (Turbine Option 1)		Solar Siting Areas	
	Temporary Disturbance (acres)	Permanent Disturbance (acres)	Temporary Disturbance (acres)	Permanent Disturbance (acres)
Agriculture Land	2,263.9	391.2	200.6	5,589.5
Developed/Disturbed	19.3	1.5	3.5	0.01
Grassland	411.1	40.2	32.6	312.5
Shrubland	185.3	43.8	46.6	706.4
Total	**2,879.6**[(a)]	**476.7**[(a)]	**283.3**[(a)]	**6,608.4**[(a)]

Source: Calculations were completed using the spatial layers provided by the Applicant.
Note:
(a) Areas of overlap between temporary and permanent disturbance are only counted toward permanent disturbance. The sum of the acres within disturbance areas of the Micrositing Corridor and Solar Siting Areas will not equal the disturbance of the comprehensive Project due to overlapping areas.

2.1.2 Project Construction, Operation, and Decommissioning Activities

Three stages would occur if the Project were authorized:

- Construction (including pre-construction)
- Operation
- Decommissioning

Chapter 4 presents analysis of impacts for each of the three Project stages concerning the elements of the environment identified in Chapter 3. This analysis is largely based on information provided in the Project’s ASC and supporting documents, additional information obtained from publicly available sources, and communications with stakeholders, including other agencies and tribes.

2.1.2.1 Project Construction

Before construction could commence, a site survey would be performed during the micrositing process to stake out the final locations of the turbines, solar arrays, site roads, electrical cables, transmission line poles, access entryways, substations, BESSs, and other supporting infrastructure. Once the survey is complete, the following would occur:

- Detailed geotechnical investigation
- Installation of stormwater pollution prevention measures
- Flagging of sensitive areas to be avoided during clearing activities

- Completion of any pre-construction surveys required by the Washington Energy Facility Site Evaluation Council (EFSEC) or applicable regulatory agencies

Next, construction would be performed in several steps and would include the following main elements and activities:

- Grading the field construction office area (also used for operations and maintenance [O&M] facilities)
- Constructing site roads, turnaround areas, and 36-foot-wide crane paths
- Constructing the turbine tower foundations and transformer pads
- Assembling and erecting the turbines
- Installing the electrical collection system – underground and some overhead lines
- Constructing the foundations and installing the posts and tracking system for the solar arrays
- Assembling the solar arrays
- Constructing and installing the substations
- Assembling the BESS(s)
- Erecting the security fence around the solar arrays, substations, and O&M facilities
- Plant commissioning and energization

Construction material and equipment would be transported to the site primarily via road systems. The primary transportation route would follow Interstate 82 before reaching local and county roads that lead into the Project's Lease Boundary. Section 4.14 discusses the effects of improvements to the road systems required to transport construction materials and equipment. Up to two laydown yard areas would be established within the Lease Boundary to facilitate the delivery and assembly of materials and equipment. The laydown yards would be located within the Micrositing Corridor. Equipment typically used in the construction of wind and solar facilities is listed in **Table 2-4**.

Table 2-4: Construction Equipment

Type of Equipment	Construction Use
Heavy Vehicles	
Bulldozer (medium)	Access road and driveway leveling
Scraper	Access road and driveway leveling
Drum Compactor	Compacting
Skid Steer Loader	Light soils work for slabs and foundations
Road Grader	Access road and driveway leveling
Excavator	Trenching and foundations
Trenching Equipment/Cable Plows	Trenching
Backhoe Loader	Moving materials
Tracked Pile Driver	Driving piles into ground
Cable Reel Truck	Dispensing cable
Concrete Pump Truck	Delivering concrete
Mobile Hydraulic Crane/Truck-mounted Crane	Moving materials
2,000 kW Generators	Turbine commissioning
Load Banks	Turbine commissioning
Large Crawler Crane	Moving materials
Water Trucks	Dust control
Fuel Trucks	Refueling equipment
Non-heavy Vehicles	
Forklifts/Telehandler	Moving materials, loading and unloading of trucks
Personnel Transport Vehicles	Transporting workers
Other Material Handling Equipment	Moving materials
Service Trucks	Maintaining heavy equipment
Other Equipment	
Disposal Containers	Disposing of and removing construction debris
Other General Industrial Equipment	Assembling structures
Plate Compactors/Jumping Jacks	Compacting soil for concrete slabs and foundations
Pressure Washers	Cleaning
Storage Containers	Storing on-site materials
Welders	Assembling structures
Air Compressors	Miscellaneous maintenance

Source: Horse Heaven Wind Farm, LLC 2021
kW = kilowatt

Turbines

The Applicant would construct up to 244 turbines within the Wind Energy Micrositing Corridor. Wind turbines are composed of three major components: the tower, the nacelle (the housing for electrical and mechanical structures that sits atop the tower), and the blades. The tubular towers proposed for the Project would be conical steel structures or a combination of steel and concrete, depending on final turbine selection. Each tower would have a lockable access door, internal lighting, and an internal ladder and lift to access the nacelle. The towers would be painted off-white per Federal Aviation Administration (FAA) regulations. Turbine blades, composed of laminated fiberglass and carbon fiber, would be attached to the rotor hub mounted to the nacelle's front. Aviation lighting would be mounted on turbine nacelles per FAA requirements. Each turbine tower is secured to a foundation, typically of reinforced concrete, spread-foot style design. Each tower's actual foundation type and design may differ depending on the on-site geotechnical studies and in-situ soil properties.

Solar Facilities

The major components of the proposed solar energy generation systems are solar modules, tracking systems, posts, and related electrical equipment. The Applicant would construct solar arrays within the Solar Siting Areas. Three potential Solar Siting Areas are analyzed:

- East Solar Siting Area, located on the east side of the Lease Boundary near Bofer Canyon
- County Well Solar Siting Area, located on the west side of the Lease Boundary near County Well Road
- Sellards Solar Siting Area, located on the west side of the Lease Boundary near Sellards Road

A 6-foot-tall security fence would enclose the solar arrays constructed in these siting areas. To calculate impacts, it is assumed that all acreage (up to 6,570 acres, a summation of permanent acreage included in **Table 2-2**) within the fenced area would be permanently impacted by the construction and operation of the solar arrays.

Battery Energy Storage Systems

Up to three BESSs would be constructed. Each would consist of a series of containers and would be placed adjacent to the substations, enclosed by a separate fence. Each BESS would be capable of storing and later deploying up to 150 MW of energy generated by the Project using lithium-ion batteries. The BESSs would help provide consistent and predictable power to the grid; for example, by minimizing short-term fluctuations in power generation from solar arrays. The details for the BESSs would depend on the final system selected. Each BESS would include, but not be limited to, the following components:

- Battery storage equipment, including batteries and racks or containers, inverters, isolation transformers, and switchboards
- Plant equipment, which may include medium-voltage and low-voltage electrical systems
- Fire suppression
- Heating, ventilation, and air conditioning systems
- Building auxiliary electrical systems
- Network/supervisory control and data acquisition (SCADA) systems
- Cooling system, which may include a separate chiller plant located outside the battery racks with chillers, pumps, and heat exchangers
- High-voltage (HV) equipment, including a step-up transformer, HV circuit breaker, HV current transformers and voltage transformers, a packaged control building for the HV breaker and transformer equipment, HV towers, structures, and HV cabling

These components are commonly placed in standard-sized shipping containers on a concrete slab. By connecting multiple containers, the BESSs can be scaled to the desired capacity. Containers may be stacked up to two levels high, with an estimated maximum height of approximately 40 feet above grade.

Substations

This Draft EIS analyzes the impacts of the construction of substations at five locations, including alternate locations. Up to four substations would be constructed for the Project. **Table 2-5** summarizes the five substation locations and their purposes. Two of the substations would be co-located with the Project's O&M facilities. Each substation would permanently occupy a 4-acre site enclosed within a security wire mesh fence and consist of the following:

- Substation transformers
- Circuit breakers
- Switching devices
- Auxiliary equipment
- A control enclosure
- Other associated equipment and facilities

The area within the Project substations' fence lines would be graded/flattened and contain a bed of crushed rock.

Table 2-5: Substation Descriptions

Project Region	Substation Name[a]	Purpose
Eastern Project Area	HH-East Substation	Connects the eastern portion of the Project to the grid via the existing 230-kV BPA transmission line.
Western Project Area	HH-West Intermediate Substation (Primary – Badger Canyon Road)	An intermediate western substation, connected to the electrical collection system, would step up the voltage of the 34.5-kV collection system to 230 kV before sending the power to the secondary substation.
	HH-West Intermediate Substation (Alternate – County Well Road)	An alternate location for the intermediate western substation, located east of the primary substation, would connect to the electrical collection system and step up the voltage of the 34.5-kV collection system to 230 kV before sending the power to the HH-West Step-Up Substation.
	HH-West Step-Up Substation 500 kV (Primary – Sellards Road)[b]	The primary location for the HH-West Step-Up Substation, which would step up the voltage from 230 to 500 kV before connecting to the grid, via an existing 500-kV transmission line to BPA's proposed Webber Canyon Substation (if BPA's substation is located on Sellards Road).
	HH-West Step-Up Substation 500 kV (Alternate – County Well Road)[b]	An alternate location for the HH-West Step-Up Substation, located north of the primary HH-West Step-Up Substation, would step up the voltage from 230 to 500 kV before connecting to the grid via an existing 500-kV transmission line to BPA's proposed Webber Canyon Substation (if BPA's substation is located on County Well Road).

Source: Horse Heaven Wind Farm, LLC 2021
Notes:
(a) As proposed in the Application for Site Certification, Table 2.3-2
(b) May alternatively be used as the HH-West Alternate Solar Substation (ASC Table 2.3-2) to support solar operations, depending on the location where the Bonneville Power Administration (BPA) elects to construct the Webber Canyon Substation.
BPA = Bonneville Power Administration; HH = Horse Heaven; kV = kilovolt; O&M = operations and maintenance

If the Bonneville Power Administration (BPA) elects to build its Webber Canyon Substation on Sellards Road, the HH-West Step-Up Substation 500 kV (Alternate – County Well Road) would be required to support the County Well Solar Siting Area, if constructed as part of the Proposed Action. If BPA elects to build its Webber Canyon Substation on County Well Road, the HH-West Step-Up Substation 500 kV (Primary – Sellards Road) would be required to support the Sellards Solar Siting Area, if constructed. Only one Intermediate Substation, either Primary – Badger Canyon Road or Alternate – County Well Road, would be constructed. For purposes of analysis, with the exception of analyses for transportation, socioeconomics, and air impacts, this Draft EIS conservatively assumes impacts from construction and operation of substations at all five potential locations.

Supporting Infrastructure

Supporting infrastructure includes existing roadway improvements and new roads, crane paths, laydown yards, O&M facilities, meteorological towers (met tower), collector lines, transmission lines, and any SCADA and communication systems. The ASC identified up to approximately 34 miles of 36-foot-wide crane paths that would be constructed between turbine locations. Crane paths would be placed within the Micrositing Corridor.

Where necessary, existing public and private roads may be temporarily widened and the turning radii increased. New access roads would be constructed within the Micrositing Corridor between existing roadways and the Project's components. The permanent access roads would be all-weather, gravel surfaces, and generally 16 feet in width for the drivable area and additional width for the shoulder and drainage (if necessary).

The Project would require two O&M facilities, each of which would be located directly adjacent to the Project's substations. One O&M facility would be located adjacent to the Project's eastern substation, and a second would be located adjacent to one of the western Project substations. Each facility would comprise a one- or two-story building that would house operating personnel, offices, operations and communication equipment, parts storage and maintenance activities, and a vehicle parking area. An area for outdoor storage of larger equipment and materials would also be included within the fenced area, permanently occupying approximately 4 acres.

Up to four permanent met towers would be installed as part of the Project. These met towers would be used to obtain wind data for performance management once the Project is operational. The final locations of the met towers would be within the Micrositing Corridor on land leased for the Project. The towers would be free-standing, with heights not to exceed the maximum hub height of the turbines (up to 411 feet). The permanent met towers would be marked and lighted as specified by the FAA. Construction of each met tower would temporarily disturb a 150-foot radius area, and each tower and its foundation would occupy a permanent footprint of up to approximately 42 by 42 feet, for a total of 1,764 square feet for each tower.

Project Phasing

The Project may be built using a "phased approach"[5] with distinct, fully functional portions of the Project potentially being built and implemented sequentially. **Table 2-6** provides the Applicant's example of the phased construction approach that is considered in the analysis of air, transportation, and socioeconomics in Chapters 3 and 4. For all other elements of the environment analyzed in this Draft EIS, the Project as a whole (reflecting the potential for all components to be built irrespective of the Applicant's phased construction approach) was analyzed.

[5] This Draft EIS is not providing a phased, or tiered, review as defined by Washington Administrative Code 197-11-060(5)(b).

This Page Intentionally Left Blank

Table 2-6: Example of Project Phasing

Project Components	Phases		
	Phase 1	**Phase 2 (Alternative A)**	**Phase 2 (Alternative B)**
Energy Generation	650 MW with 350 MW generated via wind (consisting of 58 to 124 turbines, depending on the turbine size selected, plus 300 MWac generated via solar (consisting of the eastern solar siting area)	500 MW, with 250 MW generated via wind (consisting of up to 89 turbines, depending on the turbine size selected), plus 250 MWac generated via solar (consisting of the western solar siting area adjoining the BPA Webber Canyon Substation)	500 MW generated via wind (consisting of up to 177 turbines, depending on the size selected)
BESS	150 MW AC-coupled BESS (600 MW-hr) located at the HH-East substation	150 MW AC-coupled BESS (600 MW-hr) located at the BPA Webber Canyon primary or alternate (north) substation	
BPA POI Location	Bofer Canyon Substation	Webber Canyon primary or alternate (north) substation location	Webber Canyon primary or alternate (north) substation location
Project Substations	HH-East Substation	HH-West Intermediate Substation, collects and steps up to 230 kV and HH-West Step-Up Substation (adjacent to BPA Webber Canyon Substation), steps up to 500 kV and (optional) solar substation, collects and steps up to 230 kV if western solar array is not co-located with HH-West Step-Up Substation	HH-West Intermediate Substation, collects up to 230 kV
O&M Facilities	One O&M facility located directly adjacent to the HH-East Substation	One O&M facility located directly adjacent to the HH-West Intermediate Substation	One O&M facility located directly adjacent to the HH-West Intermediate Substation
Transmission	Up to 500 feet of 230-kV transmission line would be built during Phase 1. HH-East Substation would be sited adjacent to BPA Bofer Canyon Substation	Up to 10.2 miles of 230-kV gen-tie from the HH-West Intermediate Substation to the HH-West Step-Up Substation, and Solar Intertie, connects solar array to HH-West Step-Up Substation if not co-located	Up to 19.4 miles of 230-kV intertie between the HH-East Substation and HH-West Substation
Transportation	I-82 to Coffin Road and Bofer Canyon Road; I-82 to Hwy 397 to Nine Canyon Road and S. Finley Road, to Kirk Road and Beck Road and local farm roads and new Project access roads	I-82 to Wine Country Rd, Frontier Road, Highway 221, County Well Road, Sellards Road, Webber Canyon Road, and Badger Canyon Road for substation and solar components. For wind components, I-82 to Locust Grove Road to Nicoson Road, Plymouth Road, Sellards Road, local farm roads, and new Project access roads.	I-82 to Wine Country Road, Frontier Road, Highway 221, County Well Road, Sellards Road, Webber Canyon Road, and Badger Canyon Road for substation and solar components. For wind components, I-82 to Locust Grove Road to Nicoson Road, Plymouth Road, Sellards Road, local farm roads, and new Project access roads.

Source: Table 2.15-1, Horse Heaven Wind Farm, LLC 2021

Notes:

[a] Two potential locations are shown in the ASC for substations, with corresponding potential transmission line options. The southern location, located on Sellards Road, is identified for purposes of the ASC as the “primary location” while the northern location, located on County Well Road, is identified as the “north alternative location.” Impact analysis for most resources (except socioeconomics, transportation, and air) conservatively assumes that both substations would be constructed.

ASC = Application for Site Certification; BESS = battery energy storage system; BPA = Bonneville Power Administration; I-82 = Interstate 82; kV = kilovolts; MW = megawatts; MWac = megawatts of alternative current; MW-hr = megawatt hours; O&M = operations and maintenance; POI = point of interconnection

2.1.2.2 Project Operation

The Project is anticipated to have an operating life of up to 35 years, which may be extended by repowering. An on-site operations team of up to 20 personnel would be employed at the Project to operate and maintain Project components. The team would perform scheduled preventative maintenance on the turbines, solar modules, BESSs, and any support infrastructure. The on-site team would coordinate with off-site operations staff at a Remote Operation Control Center in accordance with Federal Energy Regulatory Commission guidelines. The off-site team would assist in identifying Project components operating at non-peak efficiency and help on-site staff quickly locate potential operating issues.

Project operations would require water for solar panel washing and limited needs at the O&M facilities. Solar modules require little routine maintenance but would be washed periodically during operations, requiring an estimated 2,025,000 gallons of water per year.

The Project is expected to generate approximately one or two dumpsters of solid, non-hazardous waste per week at the O&M facilities. All waste would be stored within designated temporary waste collection areas until it is collected for transport to an approved landfill. Materials that can be recycled would be stored and transported separately.

2.1.2.3 Project Decommissioning

The Applicant would comply with Washington Administrative Code (WAC) 463-72, Site Restoration and Preservation requirements. The Applicant submitted a preliminary Decommissioning Plan with the ASC for EFSEC's review and would submit an initial Site Restoration Plan to EFSEC at least 90 days before the beginning of construction. Upon Project decommissioning, the Applicant would restore occupied land for agricultural use or as consistent with zoning requirements and landowner agreement, and would remove all aboveground infrastructure and belowground infrastructure to 3 feet or more below grade. The Applicant would replace topsoil and areas where concrete pads were located would be reseeded with native grasses and other vegetation approved by the landowner(s). Financial assurance would remain in place until decommissioning is completed to the satisfaction of EFSEC.

2.1.3 Applicant Commitments

The Applicant has committed to specific measures during the Project's pre-construction, construction, operation, and decommissioning stages. Applicant-committed measures presented in the ASC and taken into consideration in the characterization of potential impacts in each resource impact analysis (provided in Chapter 4) are summarized below. Some Applicant-committed measures may be existing requirements in rule or law. Those requirements that were listed by the Applicant in the ASC are included here. No Applicant-committed measures were proposed for wetlands, energy, and natural resources, or light and glare; however, commitments for other elements of the environment (described in Chapters 3 and 4) may have qualities that provide protection for these resources.

Agency-recommended mitigation measures are provided in Chapter 4 for each element of the environment. A high-level summary of agency-recommended mitigation measures is also provided in the executive summary of this Draft EIS.

2.1.3.1 Earth Resources

The following commitments are proposed by the Applicant and described in detail in Section 3.1 of the ASC.

- The Project would comply with the National Pollutant Discharge Elimination System through pursuance of a Construction Stormwater General Permit.
- An Erosion and Sediment Control Plan (ESCP) would be developed and implemented, detailing specific best management practices (BMPs) that would be used and where they would be placed, as well as the total disturbance area. The ESCP includes measures to prevent erosion, contain sediment, and control drainage. The ESCP would also include installation details of the BMPs.
- A Stormwater Pollution Prevention Plan would be required, detailing the activities and conditions at the site that could cause water pollution and the steps the facility would take to prevent the discharge of any unpermitted pollution.
- A stabilized construction entrance/exit would be installed at locations where construction vehicles would access newly constructed roads and/or disturbed areas from paved roads. The stabilized construction entrance/exits would be inspected and maintained for the duration of the Project's lifespan.
- Clearing, excavation, and grading would be limited to the parts of the Project area where these activities are necessary for construction and decommissioning of the Project. Areas outside the disturbance limits would be marked in the field, and equipment would not be allowed to enter these areas or disturb existing vegetation. To the extent practicable, existing vegetation would be preserved. Where vegetation clearing is necessary, root systems would be conserved if possible.
- Vegetated areas that are disturbed or removed during construction and decommissioning would be restored as near as reasonably possible to pre-disturbance conditions.
- Excavated soil and rock from grading would be spread across the site to the natural grade and would be reseeded with native grasses to control erosion by water and wind.
- Silt fencing would be installed throughout the Project as a perimeter control, and on the contour downgradient of excavations, the O&M facilities, and substations.
- Straw wattles would be used to decrease the velocity of sheet flow stormwater to prevent erosion. Wattles would be used along the downgradient edge of access roads adjacent to slopes or sensitive areas.
- Mulch would be used to immediately stabilize areas of soil disturbance, and during reseeding efforts.
- Jute matting, straw matting, or turf reinforcement matting would be used in conjunction with mulching to stabilize steep slopes that were exposed during access road installation.
- Soil binders and tackifiers would be used on exposed slopes to stabilize them until vegetation is established.
- Concrete chutes and trucks would be washed out in dedicated areas near the foundation construction locations. This would prevent concrete washout water from leaving a localized area. Soil excavated for the concrete washout area would be used as backfill for the completed footing.
- To facilitate installation of the wind turbine generator footings, large excavations would be created. Soil from these excavations would be temporarily stockpiled and used as backfill for the completed footing. Silt fencing

would be installed around the stockpile material as a perimeter control. Mulch or plastic sheeting would be used to cover the stockpiled material. Soils would be stockpiled and reused in order to prevent mixing of productive topsoils with deeper subsoils.

- After construction and decommissioning are each completed, the site would be revegetated with an approved seed mix. When required, the seed would be applied in conjunction with mulch and/or stabilization matting to protect the seeds as the grass establishes. Revegetation would take place as soon as site conditions and weather allow following construction and decommissioning.
- If water crossings are needed, check dams and sediment traps would be used during the construction of low-impact ford crossings or culvert installations. The check dams and sediment traps would minimize downstream sedimentation during construction of the stream crossings.
- During construction and operation, source control measures would be identified in the Spill Prevention, Control, and Countermeasures (SPCC) Plan to reduce the potential of chemical pollution to surface water or groundwater during construction.
- To the extent practicable, construction activities would be scheduled to occur in the dry season, when soils are less susceptible to compaction. Similarly, soil disturbance should be postponed when soils are excessively wet such as following a precipitation event.
- Equipment oil-filling, fueling, or maintenance activities would take place a substantial distance from waterways or wetlands to prevent water quality impacts in the event of an accidental release. Any oily waste, rags, or dirty or hazardous solid waste would be collected in sealable drums at the construction yards, to be removed for recycling or disposal by a licensed contractor.
- All structures would be built in accordance with current code requirements and state-of-practice methods to limit potential for issues from slope instability/topography, liquefaction, and geologic hazards, including seismic events.

2.1.3.2 Air

The following commitments are proposed by the Applicant and described in detail in Section 3.2 of the ASC.

- Construction and operations vehicles and equipment would comply with applicable state and federal emissions standards.
- Vehicles and equipment used during construction would be properly maintained to minimize exhaust emissions.
- Operational measures such as limiting engine idling time and shutting down equipment when not in use would be implemented.
- Watering or other fugitive dust-abatement measures would be used as needed to control fugitive dust generated during construction.
- Construction materials that could be a source of fugitive dust would be covered when stored.
- Traffic speeds on unpaved roads would be limited to 25 miles per hour to minimize generation of fugitive dust.
- Truck beds would be covered when transporting dirt or soil.

- Carpooling among construction workers would be encouraged to minimize construction-related traffic and associated emissions.
- Erosion-control measures would be implemented to limit deposition of silt to roadways, to minimize a vector for fugitive dust.
- Replanting or graveling disturbed areas would be conducted during and after construction to reduce wind-blown dust.

2.1.3.3 Water

The following commitments are proposed by the Applicant and described in detail in Section 3.3 of the ASC.

- Water conservation would be implemented to the extent practicable by use of less water-intensive methods of dust suppression when possible, including use of soil stabilizers, tightly phasing construction activities, staging grading and other dust-creating activities, and/or compressing the entire construction schedule to reduce the time period over which dust suppression measures would be required.
- Impacts on waters of the state may be avoided by spanning (e.g., with the transmission line) or otherwise micrositing away from the streams. If these impacts cannot be avoided, indirect impacts on water quality can be minimized by working within the ordinary high water line during the dry season when no rain is predicted.
- To control erosion and surface-water runoff during construction and operation, the Applicant would comply with a Construction Stormwater General Permit.
- A Stormwater Pollution Prevention Plan meeting the conditions of the Construction Stormwater General Permit for Construction Activities would be prepared and implemented prior to construction and again during decommissioning.
- All final designs would conform to the applicable Stormwater Management Manual.
- An SPCC Plan would be prepared to prevent discharge of oil into navigable waters.

2.1.3.4 Habitat, Vegetation, Fish, and Wildlife

The following commitments are proposed by the Applicant and described in detail in Section 3.4 of the ASC.

- To minimize impacts on wildlife, baseline studies were conducted for the Project consistent with the following guidance:
  - Washington Department of Fish and Wildlife (WDFW) Wind Power Guidelines (WDFW 2009)
  - U.S. Fish and Wildlife Service's (USFWS) 2012 Final Land-Based Wind Energy Guidelines (USFWS 2012)
  - 2013 USFWS Eagle Conservation Plan Guidance Module 1 – Land Based Wind Energy (USFWS 2013)
  - USFWS 2016 Eagle Rule Revision (USFWS 2016)
- Project facilities were sited on previously disturbed (e.g., cultivated cropland) areas to the extent feasible to avoid impacts on native habitats and associated wildlife species.
- The Project would use industry standard BMPs to minimize impacts on vegetation, waters, and wildlife.

- The Project was sited outside of wetlands and waters to the extent feasible to avoid and minimize impacts on these resources, as described in Section 3.3 and Section 3.5 of the ASC, which would also avoid impacts on fish and minimize impacts on wildlife species that use these habitats.
- If the final design results in impacts on waters of the state that cannot be avoided, the Applicant would work with EFSEC and WDFW to determine whether a Hydraulic Project Approval is required and would prepare an application accordingly.
- During construction, WDFW-recommended seasonal buffers (per Larsen et al. 2004) for ferruginous hawk nests would be observed to avoid disturbing nesting ferruginous hawks.
- During construction, WDFW-recommended seasonal buffers (per Larsen et al. 2004) for burrowing owl nests would be observed to avoid disturbing nesting burrowing owls, if present. If impacts on potentially suitable habitat cannot be avoided during final design, the Applicant would consult with WDFW regarding the need for burrowing owl surveys prior to construction, including surveys to determine habitat suitability for burrowing owls, and surveys for breeding owls if suitable habitat is present.
- The Applicant would minimize bird and bat collision with Project infrastructure by implementing down-shield lighting (e.g., for permanent lighting at the substations and O&M facilities) that would be sited, limited in intensity, and hooded in a manner that prevents the lighting from projecting onto any adjacent properties, roadways, and waterways; lighting would be motion activated where practical (i.e., excluding security lighting).
- All permanent met towers would be unguyed to minimize collision risk for wildlife.
- The Applicant would acquire any required federal approvals as described in Section 2.23 of the ASC. The Applicant would continue ongoing coordination with the USFWS (Matthew Stuber, Eagle Coordinator, Columbia Pacific Northwest Region) regarding an eagle take permit for incidental take of bald and golden eagles and would continue to evaluate eagle risk to determine if an eagle take permit is appropriate considering the use of the Project area by bald and golden eagles. The Applicant does not plan to pursue an eagle take permit but would re-evaluate eagle risk and the need for an eagle take permit throughout the life of the Project.
- Sagebrush shrub-steppe habitat would be avoided to the extent possible. If avoidance is not possible, mitigation for impacts on sagebrush shrub-steppe habitat would be developed in consultation with the applicable agencies.
- If special status plant species are observed during pre-construction surveys, individuals and populations would be avoided to the extent possible. If avoidance is not possible, mitigation measures for impacts would be developed in consultation with the applicable agencies.
- Following construction, temporarily disturbed areas would be revegetated with native or non-invasive, non-persistent non-native plant species as described in the Revegetation and Noxious Weed Management Plan (Appendix N of the ASC).
- The Applicant does not anticipate using pesticides during Project construction or operation. If unforeseen circumstances arise that require the use of pesticides, the Applicant would consult with WDFW and EFSEC regarding use of pesticides to avoid and minimize impacts on burrowing owl (per Larsen et al. 2004).

- The Applicant would limit construction disturbance by flagging any sensitive areas (e.g., wetlands, rare plant populations) and would conduct ongoing environmental monitoring during construction to ensure flagged areas are avoided.
- The Applicant has prepared a Bird and Bat Conservation Strategy that describes the surveys conducted, avoidance and minimization, and potential impacts on birds and bats and their habitat as a result of construction and operation of the Project (Appendix M of the ASC).
- The Applicant would conduct two years of standardized post-construction fatality monitoring to assess impacts of turbine operation on birds and bats. Proposed post-construction fatality monitoring is described in the Applicant's Bird and Bat Conservation Strategy (Appendix M of the ASC).
- The Applicant developed a Habitat Mitigation Plan (Appendix L of the ASC) for the wind energy generation areas of the Project, consistent with the WDFW Wind Power Guidelines, where applicable (WDFW 2009). The Habitat Mitigation Plan separately addressed mitigation for the solar and battery storage facility elements, consistent with best available industry practices.

2.1.3.5 Noise

The following commitments are proposed by the Applicant and described in detail in Section 4.1.1 of the ASC.

- Maintain all construction tools and equipment in good operating order according to manufacturers' specifications.
- Limit use of major excavating and earth-moving machinery to daytime hours (7 a.m. to 10 p.m.).
- To the extent practicable, schedule construction activity during normal working hours[6] on weekdays when higher sound levels are typically present and are found acceptable. Some limited activities, such as concrete pours, would be required to occur continuously until completion.
- Equip any internal combustion engine used for any purpose on the job or related to the job with a properly operating muffler that is free from rust, holes, and leaks.
- For construction devices that utilize internal combustion engines, ensure that the engine's housing doors are kept closed and install noise-insulating material mounted on the engine housing consistent with manufacturers' guidelines, if possible.
- Limit possible evening shift work to low noise activities such as welding, wire pulling, and other similar activities, together with appropriate material handling equipment.
- Utilize a complaint resolution procedure to address any noise complaints received from residents.
- For the Option 1 layout using 2.82-MW turbines, to demonstrate compliance with the applicable nighttime WAC regulatory limits (WAC 173-60-040) at the Project property boundary adjacent to Class A lands, select turbines would need to operate in noise-reduced operation mode. For the Option 1 layout using 3.03-MW turbines, select turbines may need to be equipped with low noise trailing edge or other noise-reducing technology.

[6] The Applicant has identified normal working hours as the hours outside the limitations provided under WAC 173-60-040.

2.1.3.6 Safety

The following commitments are proposed by the Applicant and described in detail in Section 4.1.2 of the ASC.

- All facilities would be designed per recommendations of the Institute of Electrical and Electronics Engineering Guide for Substation Fire Protection (979-2012) and the Unified Facilities Criteria (UFC) for Fire Protection Engineering for Facilities (UFC 3-600-01).
- During construction, trees and vegetation that pose a hazard to the collector lines may be topped or cleared from the right-of-way. During operation and maintenance of the Project, vegetation that is overgrown and could pose a hazard to the transmission line would be topped or cleared as needed.
- BESSs would include fire-suppression measures.
- Appropriate coordination with local emergency personnel would be conducted.
- Precautionary measures would be taken during construction to reduce fire risk.
- Construction equipment would be monitored where activities may present safety issues.
- A Draft Emergency Response Plan that addresses fire and other emergency procedures has been developed and included as part of the ASC (see Appendix P of the ASC). A finalized plan would be developed and implemented, in coordination with appropriate agencies before construction.
- All Project vehicles would be equipped with fire extinguishers.
- Fire station boxes with appropriate fire suppression equipment (e.g., shovels, water tank sprayers, sand) would be installed at multiple locations within the Project.
- No gas-powered vehicles would be allowed outside of graveled areas.
- High clearance vehicles would be used on site if required to be operated off road. Low-clearance vehicles with catalytic converters would not be parked in tall grasses.
- Any construction personnel required to handle explosives would be state-licensed explosive specialist contractors. All explosives would be secured on site in compliance with federal, state, and local requirements.
- Areas directly surrounding turbines and substations would be cleared of vegetation and graveled.
- All portable generators would be fitted with spark arrestors on the exhaust system and not allowed to operate in open grass areas.
- Hazardous material storage, spill prevention, and waste handling BMPs would be implemented and utilized during construction and operation of the Project in compliance with the construction stage and an operational stage SPCC Plan.

2.1.3.7 Land-Use Plans and Zoning Ordinance

The following commitments are proposed by the Applicant and described in detail in Section 4.2.1 of the ASC.

- Project construction, operation and decommissioning stages would follow site-specific BMPs to minimize potential impacts on noise, traffic, vegetation, and air quality, as described in the respective resource sections of the ASC.

- Upon decommissioning of the Project, the Applicant would remove all above-grade infrastructure, as well as belowground infrastructure to 3 feet or more below grade.
- The Applicant would replace topsoil and reseed areas where facilities were located with grasses and/or other vegetation reasonably acceptable to the landowner.

The following commitments are proposed by the Applicant and described in detail in Section 4.2.6 of the ASC.

- Upon Project decommissioning, occupied land would be restored for agricultural use or as required by then-current land use and zoning and landowner agreement.
- The Applicant would make arrangements with property owners and livestock owners to keep livestock out of areas where blasting or heavy equipment operations take place during construction and decommissioning.

2.1.3.8 Aesthetics

The following are commitments proposed by the Applicant and described in detail in Section 4.2.3 of the ASC.

- Active dust suppression would be implemented during construction.
- Following completion of construction, temporarily disturbed areas (e.g., laydown yards, crane paths not used as Project access roads) would be returned to their previous conditions once construction is complete.
- Restoration of the laydown yards would involve pre-construction stripping and storing topsoil, including weed avoidance, as well as removing the gravel surface, regrading to pre-construction contours, restoring topsoil and decompaction of subsoils as needed, and reseeding with approved seed mixes.
- Following completion of construction, the temporary crane paths would be removed and the area restored, in accordance with the Project's Revegetation and Noxious Weed Management Plan (Appendix N of the ASC).
- The Applicant would provide a clean-looking facility free of debris and unused or broken-down equipment by storing equipment and supplies in designated areas within the O&M facilities and promptly removing damaged or unusable equipment from the site.
- The turbines and solar arrays would be uniform in design to present a trim, uncluttered, aesthetically attractive appearance.
- The only exterior lighting on the turbines would be aviation warning lights and, potentially, mid-tower lighting, depending on the size of the tower, as required by the FAA.
- The Applicant would construct support facilities with non-reflective materials in muted tones, as well as the use of white or light gray, non-reflective paint to eliminate the need for daytime aviation lighting and eliminate glare from the turbines.
- Sensors and switches would be used to keep security lighting turned off when not required, and all lights except aviation safety lighting would be hooded and directed downward to minimize light pollution.
- Any perimeter lighting at the O&M facilities and BESSs would be activated only during maintenance or emergency activities at night.

2.1.3.9 Recreation

Commitments specific to recreation were not proposed. Site-specific BMPs implemented during construction and operation to minimize potential impacts on noise, traffic, and visual surroundings (as described in the respective resource sections of the ASC) would minimize impacts on recreational users (Section 4.2.4 of the ASC).

2.1.3.10 Historic and Cultural Resources

The following are commitments proposed by the Applicant and described in detail in Section 4.2.5 of the ASC.

- Prior to construction of the Project, a qualified archaeologist would be retained and would provide a cultural resource briefing that includes:
  - All applicable laws and penalties pertaining to disturbing cultural resources
  - A brief discussion of the prehistoric and historic regional context and archaeological sensitivity of the area
  - Types of cultural resources found in the area
  - Instruction that Project workers would halt construction if a cultural resource is inadvertently discovered during construction
  - Procedures to follow in the event an inadvertent discovery (Inadvertent Discovery Plan discussed below) is encountered, including appropriate treatment and respectful behavior of a discovery (e.g., no posting to social media or photographs).

  If requested, a local tribal representative(s) would be invited to participate in the environmental training to discuss or provide text from a tribal cultural perspective regarding the cultural resources within the region.

- The Applicant would retain a qualified archaeologist to prepare and implement a Cultural Resource Pre-construction Survey and Avoidance Plan. The plan would provide protocols for pre-construction surveys of areas that have not been previously surveyed (e.g., during final design, construction needs, etc., extend beyond previously surveyed areas) and outline cultural resource avoidance measures. Tribal representatives would be invited to monitor the site during construction.

- Recorded cultural and historic resources would be avoided through modification of Project design and through buffers and protective signage or flagging, as well as monitoring, as appropriate. If a resource cannot be avoided, a qualified archaeologist would develop additional archaeological investigation measures and additional mitigation in coordination with the Department of Archaeology and Historic Preservation (DAHP) and tribes, as appropriate.

- An Archaeological Excavation and Removal Permit would be pursued if any alteration of any pre-contact archaeological site were to occur, regardless of the level of disturbance. For historic-era archaeological sites, permits would be pursued for any removal or excavation of those that are eligible for or listed on the National Register of Historic Places.

- The Applicant would retain a qualified archaeologist to prepare an Inadvertent Discovery Plan for the Project and avoidance procedures. During Project-level construction, should subsurface archaeological resources be discovered, all activity in the vicinity of the find would stop and a qualified archaeologist would be contacted to assess the significance of the find according to Washington Heritage Register and National Register of Historic Places criteria (as applicable). If any find is determined to be significant, the archaeologist would determine, in consultation with the implementing agencies and local Native American groups expressing interest, appropriate avoidance measures or other appropriate mitigation. If a resource cannot be avoided, a qualified archaeologist would develop additional archaeological investigation measures, such as data recovery or other appropriate measures, in consultation with the implementing agency, DAHP, and appropriate Native American representatives.

- If evidence of human burials is encountered, all ground-disturbing activity in the vicinity would be halted immediately, and the DAHP, Benton County Planning and Community Development Department, Benton County Sheriff's Office, Applicant, and appropriate tribes would be notified immediately. No work would resume within a 100-foot radius (or appropriate distance) of the find until all the appropriate approvals are received.

2.1.3.11 Transportation

The following commitments are proposed by the Applicant and described in detail in Section 4.3 of the ASC.

- Any road improvements made during the Project's construction would be removed and the area restored to pre-construction conditions to the extent practical unless otherwise requested by the landowner.
- All road improvement and construction would be done in conjunction with Benton County Public Works requirements following Benton County standards. The Applicant would maintain new access roads to access the turbine structures during operations.
- Prior to commencement of construction, the Applicant would consult with the Washington State Department of Transportation (WSDOT) and Benton County to develop a construction-stage Traffic Management Plan.
- A detailed haul plan would be developed once turbines have been selected and a construction schedule developed. The haul plan would confirm source locations and routes to be used during Project construction, as well as anticipated loads and haul schedule.
- The Transportation Study (Appendix V of the ASC) would be verified and updated to include detailed condition assessments of roads to be used, structural assessments, and plans for improvement and maintenance.
- Ingress and egress points would be located and improved (if needed) to ensure adequate capacity for existing and projected traffic volumes and to provide efficient movement of traffic, including existing and anticipated agricultural traffic.
- The Applicant would obtain all necessary WSDOT permits to access, modify ingress and egress to, or transport regulated loads on state-managed roadways.
- The Applicant would obtain WSDOT trip permits for oversize and overweight loads.
- The Applicant would coordinate with EFSEC and Benton County to identify a qualified third-party engineer who would document road conditions prior to construction and again within 30 days after construction is complete or as weather permits.
- A service agreement between the Applicant and Benton County would ensure post-construction road restoration to conditions as good or better than pre-construction.
- The Applicant or its contractor and EFSEC staff would meet prior to final site plan approval to outline steps for minimizing construction traffic impacts, including conflicts if state-imposed roadway restrictions could affect transporter routes.

- The Applicant or its contractor would provide advance notification to adjacent landowners and farmers through mailing, informal meeting, open house, or other similar methods when construction takes place in the vicinity of their homes and farms to help minimize access disruptions.
- All construction vehicles would yield to school-related vehicles (e.g., school busses) and would lower their speed when approaching a school bus or bus stop along the transporter route.
- Advanced warning and proper roadway signage would be placed on major state and county roads to warn motorists of potential Project-related vehicles entering and exiting the roadway.
- When slow or oversized wide loads are being hauled, appropriate vehicle and roadside signing and warning devices would be deployed. Pilot cars would be used as WSDOT dictates, depending on load size and weight.
- Carpooling among the construction workers would be encouraged to reduce traffic volume to and from the Project site.
- Detour plans and warning signage would be provided in advance of any planned traffic disturbances.
- Flaggers would be employed as necessary to direct traffic when large equipment is exiting or entering public roads to minimize risk of accidents. Should the Applicant or its construction contractor receive notice during Project construction of transportation events (e.g., WSDOT or Benton County transportation projects, roadway incident, other traffic events) that give rise to a safety concern, the Project construction manager would review the Traffic Management Plan in coordination with the applicable agency and address additional safety measures, including flagging, as may be appropriate for the situation.
- If lane closure must occur, adequate signage for potential detours or possible delays would be posted.
- Advance notification would be provided to emergency providers and hospitals when public roads may be partially or completely closed.
- Emergency vehicles would be given the right-of-way per local, state, and federal requirements.
- Site access roads and an entrance driveway to the O&M facilities on site would be constructed to service truck movements of legal weight and provide adequate sight distance.
- Traffic control requests would be coordinated through the WSDOT traffic engineer and the Benton County public works department, abiding by seasonal county road restrictions.
- A haul and approach route would be developed in coordination with the appropriate jurisdictional authorities.
- Permanent private Project access roads would be maintained by the Applicant for the life of the Project.
- Tracked vehicles and heavy trucks would be restricted to approved transporter roads to prevent damage to surface and base of county roads.
- Turbines and permanent met towers would be lit according to regulations established by the FAA.
- The Applicant would obtain Determinations of No Hazard to Air Navigation from the FAA.
- Advance warning and proper roadway signage would be placed on highways and county roads to warn motorists of potential vehicles entering and exiting the roadway.

- After construction, all-weather access roads (including graveled roads), suitable to handle emergency equipment, would be provided within 150 feet of any built structure or surface activity area.

2.1.3.12 Socioeconomic Environment

The following commitments are proposed by the Applicant and described in detail in Section 4.4 of the ASC.

- Active dust suppression would be implemented during construction.
- Engine idling time would be limited, and equipment would be shut down when not in use, to limit air emissions.
- Noise mitigation measures would include maintaining all tools and equipment in good operating order, using properly muffled construction equipment, and scheduling construction activity during normal working hours on weekdays to the extent possible.
- Prior to commencement of construction, the Applicant would consult with WSDOT and Benton County on the development of a construction-stage Traffic Management Plan that would be designed to reduce and manage construction-related transportation impacts.
- The Applicant would coordinate with the Benton County Fire Marshal and other appropriate agencies to finalize an Emergency Response Plan, as well as coordinate with local emergency services personnel and provide training where necessary.

2.2 Alternatives to the Proposed Action

2.2.1 Alternatives Considered

The following alternatives were considered for analysis:

- **Solar Only:** Under this alternative, only the solar facilities and supporting infrastructure would be constructed within the 10,755 acres of Solar Siting Areas, resulting in a permanent disturbance footprint of approximately 6,570 acres. The Applicant would consider all solar technology available at that time to design the most efficient and effective solar array layouts.
- **Wind Only:** Under this alternative, only the wind turbines and supporting infrastructure would be constructed within the 11,850 acres of Wind Energy Micrositing Corridors, resulting in approximately 476.6 acres of permanent disturbance.
- **No Action:** Under the No Action Alternative, the Project would not be constructed or operated, power would not be supplied from the Project, and the potential environmental impacts associated with the Project would not occur. Existing agricultural use in the Lease Boundary would continue without interruption. The Benton County Comprehensive Land Use Plan and the zoning ordinance would continue to govern the development of the land within the Lease Boundary.

2.2.2 Alternative Carried Forward for Detailed Analysis

The Solar Only and Wind Only alternatives were eliminated from detailed analysis because they would not generate the designed nameplate generating capacity required by the Applicant.

The No Action Alternative was carried forward for analysis in the Draft EIS.

3.0 CHAPTER 3 – AFFECTED ENVIRONMENT

3.1 Introduction

This chapter describes the existing environment without the construction and operation of the proposed Horse Heaven Wind Farm (Project, or Proposed Action), which represents the existing conditions under the No Action alternative.

Chapter 3 has been subdivided into separate sections, one for each element of the environment listed in Washington Administrative Code (WAC) 197-11-444[1] and an additional section describing existing conditions related to the socioeconomic environment:

- Earth Resources (including seismic hazards)
- Air Quality
- Water Resources
- Vegetation
- Wildlife and Habitat
- Energy and Natural Resources
- Land and Shoreline Use
- Historic and Cultural Resources
- Visual Aspects, Light and Glare
- Noise and Vibration
- Recreation
- Public Health and Safety
- Transportation
- Public Services and Utilities
- Socioeconomics

Chapter 4, Analysis of Potential Impacts and Mitigation presents an evaluation of potential impacts to the affected environment.

3.1.1 Use of Applicant-Prepared/Provided Information

This analysis of affected environment is based primarily on information provided by Horse Heaven Wind Farm, LLC (Applicant) in the Application for Site Certification (ASC) for the Project. A variety of documents and information sources provided by the Applicant were used during the preparation of this Draft Environmental Impact Statement (EIS). These Applicant-provided documents include Applicant responses to formal Washington Energy Facility Site Evaluation Council data requests, preliminary engineering plans, and a variety of reports and technical documents prepared by the Applicant's consultants.

However, to support the decision-making process, a Washington State Environmental Policy Act review must be objective. To confirm what the Applicant has presented in their ASC, this Draft EIS used information sourced from independent institutions and government agencies. Additionally, the Draft EIS incorporates the professional judgment of specialists. Their insights and recommendations are supported by data, education, or experience and are substantiated with literature.

Pertinent sources used in addition to the ASC are listed in Chapter 6, References.

[1] Washington Administrative Code (WAC) 197-11-444 includes a list of "elements of the environment" that are typically considered for inclusion during preparation of an Environmental Impact Statement. The SEPA lead agency (i.e., EFSEC) has flexibility to narrow the topics addressed in the EIS within these topic areas.

This Page Intentionally Left Blank

3.2 Earth Resources

This section describes existing earth resources and geologic hazards in the State of Washington, the proposed Horse Heaven Wind Farm (Project, or Proposed Action), and within the Project's Lease Boundary. The Project vicinity includes the areas 4 miles south/southwest of the City of Kennewick, Washington, and the larger Tri-Cities urban area along the Columbia River. Section 4.2 presents an evaluation of the Project's consistency with relevant earth resource documents and ordinances and adopted state, county, and local plans, goals, and policies, including the potential impact the Project would have on earth resources.

Regulatory Setting

The State of Washington's Growth Management Act (GMA), Revised Code of Washington 36.70A, requires all cities, towns, and counties in the state to identify critical areas and establish regulations to protect and limit development in those areas. Among the critical areas defined by the GMA are frequently flooded areas and geologically hazardous areas. As defined by Washington Administrative Code (WAC) 365-190-120, geologically hazardous areas are areas that are susceptible to erosion, landslide, seismic activity, or other geological events such as coal mine hazards, volcanic hazards, mass wasting, debris flows, rock falls, and differential settlement. The GMA requires that local governments establish critical area protection programs that address the following:

- Protecting members of the public, public resources, and facilities from injury, loss of life, or property damage due to landslides and slope failures, erosion, seismic events, volcanic eruptions, or flooding
- Maintaining healthy, functioning ecosystems through the protection of unique, fragile, and valuable elements of the environment
- Directing activities not dependent on critical area resources to less ecologically sensitive sites, and mitigating unavoidable impacts on critical areas by regulating alterations in and adjacent to those areas
- Preventing cumulative adverse environmental impacts on frequently flooded areas

As defined by WAC 463-62-020, the seismicity standard for construction of energy facilities shall be the standards contained in the state building code.

3.2.1 Affected Environment

The Lease Boundary is located in the Horse Heaven Hills area of Benton County, Washington, within the larger Columbia Basin Physiographic Province of Washington and the wider Pacific Northwest region of the United States and British Columbia, Canada (Clarke and Bryce 1997).

3.2.1.1 Regional Geology

The geology and earth resources within the Lease Boundary are part of, and subject to, geological forces and processes affecting the wider Pacific Northwest region, which includes Oregon, Washington, Idaho, and British Columbia. This section provides a brief description of the major regional geological processes that have produced the earth resources within the Lease Boundary and Project vicinity.

Geological Processes – Plate Tectonics

The geological history of the Pacific Northwest reflects the evolution of plate tectonic forces. In the region of the proposed Project, between about 17 and 6 million years ago, large volumes of lava erupted from deep crustal fissures above a "mantle hotspot." These basalt flows make up the Columbia River Basalt Group, which is the most common type of exposed rock in the region. The recent geology of the Pacific Northwest region has been strongly influenced by geological processes associated with the convergence of three major tectonic plates:

- North American
- Juan de Fuca
- Pacific

The region where the Juan de Fuca and North American tectonic plates interact is known as the Cascadia Subduction Zone (CSZ). The Juan de Fuca plate is entirely oceanic (below sea level) and is slowly sinking and moving eastward beneath the western edge of the North American plate (Yeats 2004). This type of movement is known as subduction. The Pacific plate is also an oceanic tectonic plate that lies beneath the Pacific Ocean and adjoins the Juan de Fuca plate. The separation of the Pacific and Juan de Fuca plates causes the Juan de Fuca plate to move eastward, beneath the western edge of the North American plate. As the Juan de Fuca plate moves away from the Pacific plate, the gap between the plates is filled with molten rock to form regions known as “spreading centers” that have many hot springs and undersea eruptions. The rate of the Juan de Fuca plate’s eastward movement is about 2 inches per year (Swanson et al. 1989). This slow movement drives most of the active geological processes observed in the Pacific Northwest. These processes include the generation of large and small earthquakes, formation and eruption of volcanoes, and uplift and folding of the earth’s surface.

The relative motions of the tectonic plates cause changes in the structure of the rocks in the overlying North American plate. Ongoing plate movements along the western edge of the North American plate have broken it into smaller pieces or crustal blocks. As shown in **Figure 3.2-1**, these blocks include the Oregon Coastal Range, Canadian Coastal Mountains, and Sierra Nevada blocks. The northward motion of the Oregon Coastal Range block has pushed western Washington against the Canadian Coast Mountains, which have not moved relative to the rigid North American plate. This process has caused most of Oregon and southwest Washington to rotate clockwise relative to North America at a rate of 0.4 to 1.0 degrees per million years (Wells and Heller 1988; Wells and Simpson 2001; Brocher et al. 2017). These rotations and block movements result in north-south-directed compression and the folding of the earth’s crust in Washington.

The north-south-directed compression and folding in the shallow crust of eastern Washington has formed the Yakima Fold and Thrust Belt (YFTB). The YFTB is expressed as a series of alternating ridges and valleys known as anticlines (ridges) and synclines (valleys). An “anticline” is the geologically high part of one or more geological units that have been folded by geological forces. A “syncline” is a geological trough and, therefore, the lower part of one or more geological units. As shown in the inset in **Figure 3.2-1**, the geologically young ridge-and-valley topography of the YFTB consists of narrow anticlinal ridges up to 2,000 feet high, separated by broad synclinal valleys 1 to 10 miles wide over an area of about 5,500 square miles in eastern Washington (Reidel et al. 2003).

Geological Processes – “Ice Ages”

Another major impact on the geology of the region was the advance and retreat of the major continent-wide glaciers of many “ice ages” over at least the last million years. During the most recent period of major glaciation from about 15,000 to 10,000 years ago, glaciers created an ice dam on the Clark Fork River in northern Idaho. This caused the river to back up and form a lake, known as Lake Missoula. At the end of the ice age, ice began to melt, causing water to flow into the lake and further increase its size.

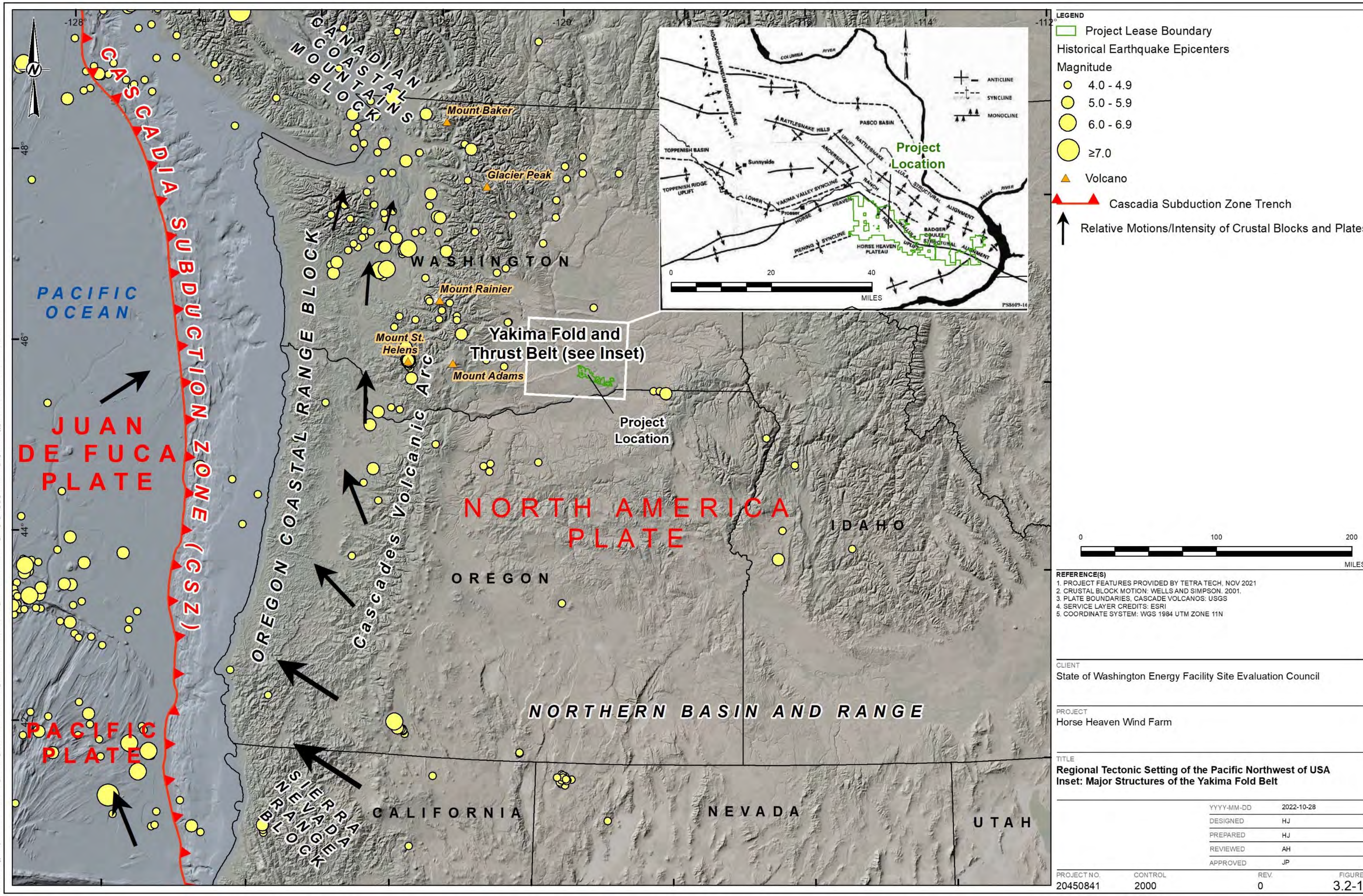


Figure 3.2-1: Regional Plate Tectonics

As the ice melted, glacial Lake Missoula overwhelmed the ice dam, causing it to suddenly collapse and release large-scale flooding across eastern Washington and around the Columbia River. This event caused huge volumes of lake water to flow rapidly west to the Pacific Ocean. Over a period of about 2,000 years, the ice dam of glacial Lake Missoula failed repeatedly, draining the lake and causing great floods down the Columbia River. These sudden releases of water carved wide and deep channels into the underlying basalt bedrock, forming a stripped and eroded “channeled scabland” landscape.

Evidence of the repeated flooding events caused by Lake Missoula can be seen today at the Wallula Gap and Grand Coulee. The Wallula Gap and Grand Coulee form a two-stage canyon 50 miles long and up to 900 feet deep. The giant floods through the Wallula Gap and Grand Coulee discharged an estimated 350,000,000 cubic feet per second each time the lake flooded. The extensive flooding from the repeated collapses of the Lake Missoula ice dams stripped most of the near-surface layers of topsoil and glacial deposits in eastern Washington and northern Oregon. Flood events before the last ice age deposited the older glacial and glacial lake sediments in western Washington and the Pacific Ocean. These sediments were subsequently blown back into the Columbia Basin by the dominant southwesterly winds (Sweeny et al. 2017). Geologists refer to these wind-blown silt and fine sand deposits as eolian loess.

3.2.1.2 Site Conditions

Geology

As shown in **Figure 3.2-2**, the surficial geology of the Lease Boundary consists of Columbia River Basalt Group lava flows that are overlain by wind-blown loess and some glaciolacustrine deposits. The Geologic Map of Washington describes the Lease Boundary geology as Quaternary-age (last 2.6 million years) non-marine loess and glaciolacustrine deposits consisting of the following:

- Homogeneous and unconsolidated fine-grained sand and silt with some gravel, clay, and diatomaceous earth
- Miocene-Pliocene dark gray, fine-grained basalt commonly interbedded with conglomerate, sandstone, and siltstone (Huntting et al. 1961).

As illustrated in **Figure 3.2-2**, the local bedrock is consistent with the Columbia River Basalt Group, with many lava flows interbedded with sedimentary layers formed by the erosion and deposition of the volcanic rocks. These basalt rocks and lava flows underlie the wind-blown loess and silt and form the bedrock within the Lease Boundary.

On-site Geotechnical Investigation

Horse Heaven Wind Farm, LLC (Applicant) conducted a preliminary geotechnical investigation of the Lease Boundary. The investigation found that:

- Basalt was encountered at various stages of weathering at depths of 5 to 45 feet below ground surface (bgs).
- Two basalt core samples from the geotechnical drilling were laboratory tested to evaluate the strength of the basalt for proposed facility foundations. The in-situ moist unit weight of basalt on site is estimated at 170 pounds per cubic foot, and the compressive rock strength of the basalt ranges from 470 to 2,415 tons per square foot.

The Applicant’s preliminary geotechnical evaluation concluded that variability in compressive strength reflects the variability in the degree of weathering and fracturing of the basalt on site (Horse Heaven Wind Farm, LLC 2021).

This Page Intentionally Left Blank

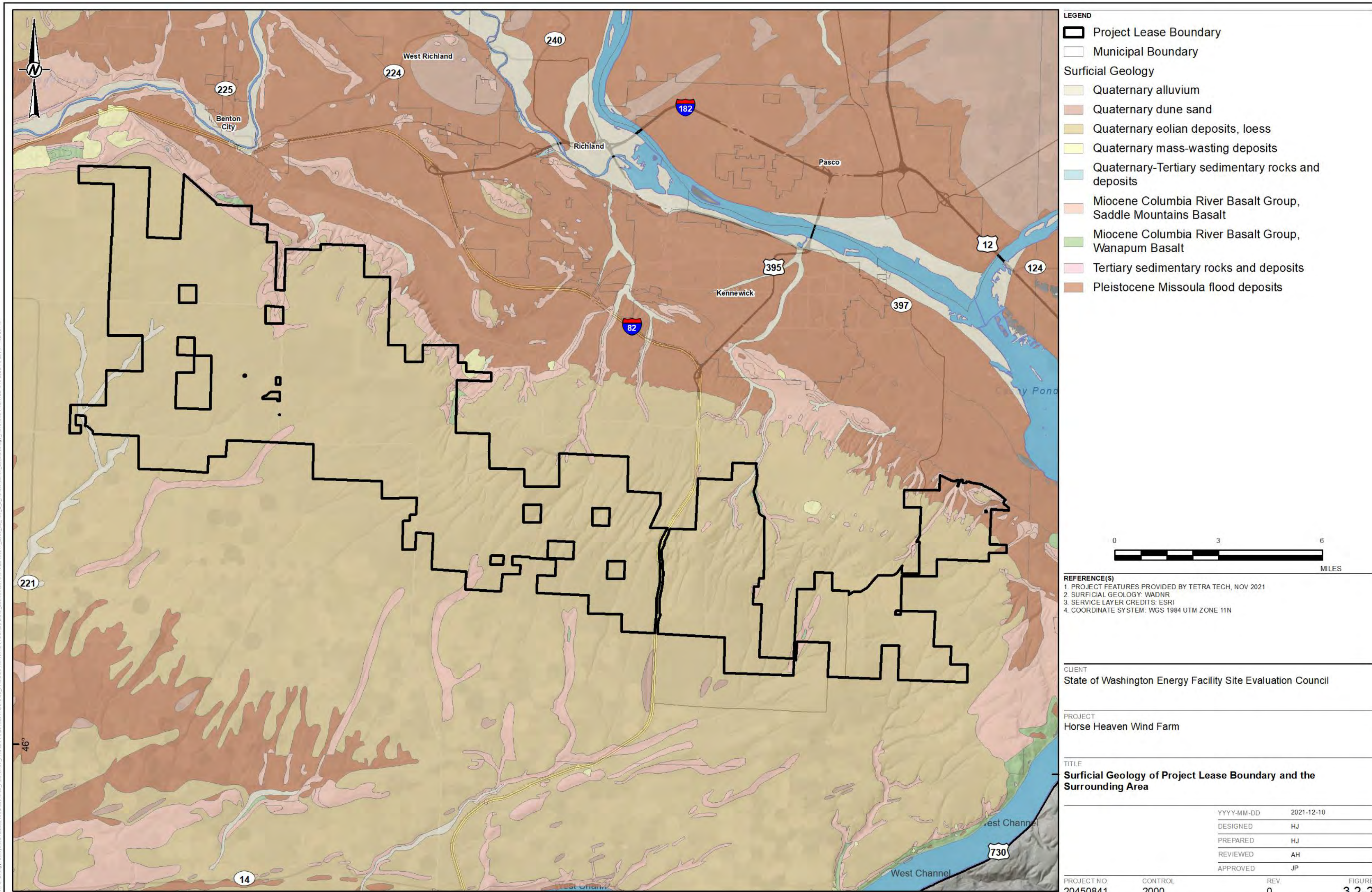


Figure 3.2-2: Project Vicinity and Lease Boundary Geology

Soils

To evaluate potential surface impacts from the Project, it is important to assess the types of soils at the site. The Applicant's preliminary geotechnical investigation report indicates that loess covers most of the Lease Boundary. Based on the U.S. Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) Web Soil Survey data, and as shown in **Figure 3.2-3**, the most prominent and widely distributed soil unit mapped within the Project area is Ritzville Silt Loam (USDA 2021).

The NRCS maps Ritzville Silt Loam within the Lease Boundary as a silt loess (ML). This mapping unit is characteristic of the loessial and glaciolacustrine deposits from the post-glacial Lake Missoula flood events. Less extensive soil units intermixed across the Lease Boundary include silt loams, fine sandy loams, very fine sandy loams, stony fine sandy loams, and very stony silt loams.

The most prevalent natural soil cover across the Lease Boundary is very loose to medium dense silt, with varying amounts of sand (loess). In some places, the soil has been modified by natural and agricultural activities. The Applicant's preliminary geotechnical study presented in the Application for Site Certification (ASC) describes the soil stratigraphy for the Lease Boundary as follows:

- **Topsoil.** Generally light brown and silty, with low to moderate organic content and active roots. Thicknesses range from non-existent to approximately 4 inches bgs. Topsoil layers are assumed to be thicker in topographic low areas and pastureland.
- **Silt, Silt with Sand, Sandy Silt.** Underlying the topsoil across the Lease Boundary is a wind-blown silt, or loess, with varying amounts of sand. The silty material within the Lease Boundary is light brown to brown, dry to damp, very loose to medium dense, and occasionally lightly cemented. Loess is encountered directly beneath the topsoil and occasionally extends to the underlying basalt, with thicknesses ranging from 5 to greater than 60 feet bgs.
- **Silty Sand.** Silty sand, with varying amounts of gravel, underlies the loess in some places. This soil unit is typically light brown to brown, dry to damp, and medium dense to very dense (Horse Heaven Wind Farm, LLC 2021).

Expansive soils can occur in areas where repeated changes in moisture content such as rainfall, irrigation, perched groundwater, or drought result in the formation of expansive clays. Shrinking and swelling of expansive clay soils can cause changes in foundation conditions that require special engineering. However, the Web Soil Survey data classify the soils within the Lease Boundary as generally having a low potential for soil expansion (USDA 2021).

On-site Soils Investigation

The Applicant performed laboratory tests on representative soil samples collected from the Lease Boundary to aid in the classification and evaluation of physical properties and engineering characteristics of site materials. The Applicant's preliminary geotechnical investigation for the Lease Boundary describes the geotechnical characteristics of the Lease Boundary's soils as follows:

- The in-situ gravimetric moisture contents of the soils range from approximately 2 to 5 percent, averaging 8 percent. These levels indicate relatively low levels of soil moisture. The in-situ moist unit weight of soil on site is estimated at 80 to 110 pounds per cubic foot for all soil types.
- The friction angle for the silty loess encountered on site is estimated to range from 28 to greater than 40 degrees, very loose to very dense soil (Horse Heaven Wind Farm, LLC 2021).

This Page Intentionally Left Blank

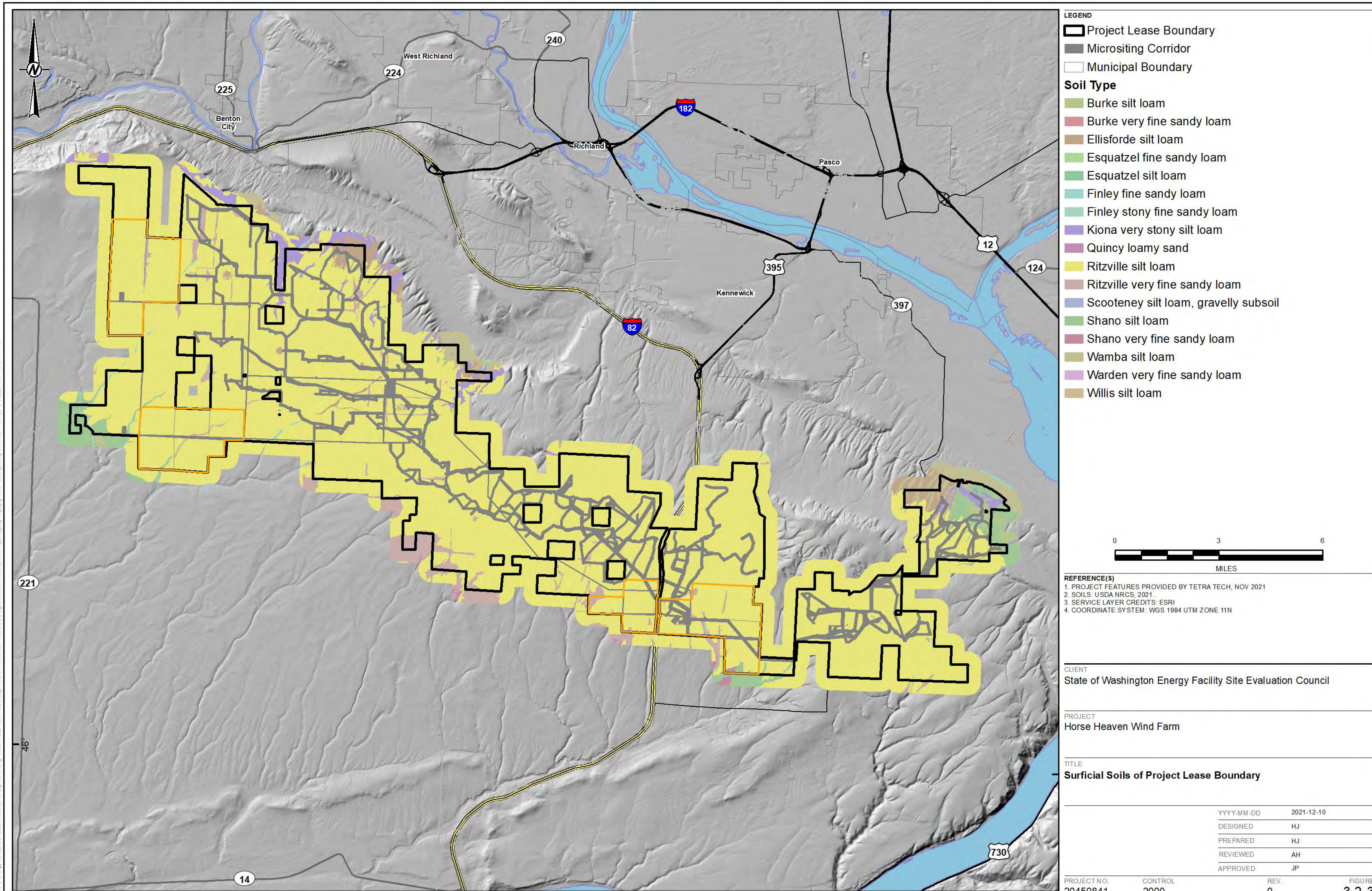


Figure 3.2-3: Lease Boundary Soils Data

The soil borings, descriptions, and laboratory tests indicate that the Lease Boundary is primarily underlain by very loose to medium dense silt. The loose silt layers are considered compressible and could be susceptible to static settlement upon loading. The shallow soil within the Lease Boundary is susceptible to collapse upon wetting. Soil collapse occurs when a relatively loose, dry, low-density material is inundated with water and subjected to a load. The Applicant's preliminary geotechnical investigation report concluded that the collapse potential of soils within the Lease Boundary is moderate to high. Loess silt is particularly prone to collapse because of its depositional mode (i.e., wind) and can result in development of a loose, low-density soil profile.

If fine- to medium-grained granular soils (silt and fine sand) are saturated during earthquake-induced strong ground shaking, they can lose strength through liquefaction. Under high levels of ground shaking, saturated loess silt deposits could become susceptible to soil liquefaction. The dense, coarse-grained sand and gravel layers within the Lease Boundary are much less susceptible to liquefaction (Horse Heaven Wind Farm, LLC 2021). Soil liquefaction processes are described further under General Earthquake Hazards, below.

Topography

The topography of the Columbia Basin Province is characterized by steep river canyons, sharp ridge lines, and broad plateaus. The Horse Heaven Hills ridgeline lies along the northern border of the Lease Boundary. To the south of the ridgeline, the topography is dominated by rolling hills and undulating plains, crossed by meandering canyons, with some ephemeral or intermittent drainage channels. As illustrated in **Figure 3.2-4**, the Lease Boundary is located on the Horse Heaven Hills ridgeline anticline at the eastern edge of the YFTB.

There are no major rivers or other perennial streams within the Lease Boundary. The elevation of the Lease Boundary ranges from 604 to 2,051 feet above mean sea level. The nearest major water bodies are the Columbia and Yakima Rivers. Both rivers are topographically lower than the Lease Boundary. At its nearest location, the Yakima River passes 1.5 miles north of the western part of the Lease Boundary. The Columbia River is located north, east, and south of the Lease Boundary. At its nearest location, the Columbia River is 1.3 miles away from the Lease Boundary's eastern border (Horse Heaven Wind Farm, LLC 2021).

Groundwater

Local water well depths within the Lease Boundary reportedly range between 55 and 1,506 feet bgs (Ecology 2020). During the Applicant's geotechnical investigation, boreholes were evaluated for the presence and level of any groundwater during and shortly after drilling operations. The boreholes did not display a static groundwater level (Horse Heave Wind Farm, LLC 2021). Sections 3.4 and 4.4 evaluate the Project's anticipated impacts on groundwater resources.

3.2.1.3 Geological Hazards

Geologic hazards include earthquakes, landslides, debris flow flooding, problem soils, and rock and volcanic hazards. This section discusses geological hazards that could impact the Project and Lease Boundary.

General Earthquake Hazards

The magnitude of an earthquake is measured by analyzing records from an array of regionally deployed seismometers. The most common magnitude scale now used by seismologists is the moment magnitude, expressed as M_W or M. This scale measures the energy released at the earthquake source. The M_W and most other earthquake magnitude scales are logarithmic, meaning that an earthquake of M_W 6 releases about 30 times more energy at the source than an M_W 5 earthquake. Most people do not feel earthquakes smaller than M_W 3 unless they are within approximately 5 miles of the epicenter and the earthquake is less than about 10 miles deep. The main hazards associated with earthquakes within the Pacific Northwest are:

- Surface fault rupture
- Strong ground shaking
- Soil liquefaction
- Surface fault rupture
- Tsunami and seiche

Earthquake hazards in the Pacific Northwest are primarily related to ongoing activity in the CSZ, with the convergence of the North American and Juan de Fuca tectonic plates. **Figure 3.2-4** presents the tectonic setting of the Pacific-Juan de Fuca-North American plate boundary region in the Pacific Northwest. The major types of earthquakes that occur in the Pacific Northwest region are:

- **Megathrust CSZ Earthquakes:** Also referred to as a subduction interface earthquake, this type results from shallow rupture at the interface or boundary between the Juan de Fuca and the overriding North America plate tectonic plates less than 30 miles from the surface.
- **Deep CSZ Earthquakes:** Also referred to as a subduction in-slab earthquake, this type results from stresses within the subducting Juan de Fuca plate beneath the plate interface during its slow descent beneath the Pacific Northwest.
- **Shallow Crustal Earthquakes:** Also referred to as a background earthquake, this type originates along known and mapped crustal fault zones. These earthquakes are known as crustal fault earthquakes. There are also shallow crustal earthquakes that are not associated with mapped faults and occur within the region between the mapped faults.

Convergence of the Juan de Fuca and the North American plates along the CSZ generates subduction interface earthquakes. The earthquakes are generated by sudden rupture along the upper, brittle part of the Juan de Fuca-North American plate boundary. Subduction interface earthquakes are infrequent, but when they do occur, they can be up to M_W 9+. Subduction interface earthquakes of this magnitude have not been recorded in the Pacific Northwest in written history, but geologic evidence along the Pacific Coast, from Northern California to British Columbia, indicates that multiple CSZ subduction interface earthquakes of M_W 8+ to M_W 9 have occurred during the last 10,000 years (e.g., Atwater et al. 1995, 2005; Clague at al. 2000; Kelsey et al. 2005; Nelson et al. 2006). The last known subduction interface earthquake in the Pacific Northwest occurred in January 1700, just over 300 years ago. Geological evidence indicates that such great earthquakes have occurred at least seven times in the Pacific Northwest over the last 3,500 years. This represents an average recurrence return interval of 400 to 600 years (Pacific Northwest Seismic Network 2021).

As the Juan de Fuca plate subducts beneath the North American plate, the increase in rock and bending stresses within the plate can lead to subduction in-slab earthquakes. In-slab earthquakes have lower maximum magnitudes and are deeper than megathrust subduction interface earthquakes. Most CSZ in-slab earthquakes have been recorded beneath the Puget Sound region; the largest historical in-slab earthquakes are the 1949 M_W 6.9 Olympia, the 1965 M_W 6.7 Seattle-Tacoma, and the 2001 M_W 6.8 Nisqually earthquakes.

The subduction of the Juan de Fuca plate also compresses and deforms the western edge of the North American plate to form crustal faults and folds. Crustal fault earthquakes are caused by rupture of shallow faults that extend to depths of up to 15 miles. Background earthquakes are generated by unmapped and deeper faults within the shallow crust away from known and mapped faults.

In addition to the major types of earthquakes that occur in the Pacific Northwest, the region's active volcanoes can also cause earthquakes. Volcanic earthquakes are not caused directly by tectonic plate motion, but rather occur during upward migration of molten rock (magma) beneath and within the present-day volcanoes of the Cascade Ranges. These earthquakes are local to the volcanic centers and typically are not felt away from the volcano and its immediate surrounding area. During larger volcanic eruptions, such as Mount St. Helens in 1980, volcanic earthquakes may cause strong shaking several miles from the volcano.

Project-specific Earthquake Hazards

The State of Washington experiences more than 1,000 earthquakes annually. Over the last 125 years, Washington has experienced more than 20 damaging earthquakes. Most of the earthquakes that happen in Washington occur in western Washington, but several have occurred east of the Cascade crest. For instance, the 1872 Lake Chelan earthquake occurred in eastern Washington and is one of the state's largest recorded earthquakes (Benton County 2019).

Within central Washington, the Wallula Fault Zone runs through Benton County. Researchers have suggested that the fault zone has the potential to produce a magnitude 7.5 earthquake. If an earthquake of this magnitude were to occur, it would generate very strong ground shaking with the potential to cause surface cracking, soil liquefaction, and damage to infrastructure throughout Benton County (Benton County 2019).

Surface Fault Rupture

The initial displacement along a fault, also referred to as a fault rupture, releases energy that moves away from the fault as seismic waves. In larger earthquakes that have a moment magnitude of 6, the fault can rupture to the ground surface. Surface fault rupture results in large differential ground displacements of up to 30 feet. Surface fault ruptures can cause structural damage to buildings, bridges, and other infrastructure located across the fault rupture.

Project-specific Hazard - Surface Fault Rupture

While tectonic plate subduction zones along the Pacific Coast can produce large, devastating earthquakes, the smaller faults within the eastern part of Washington typically produce small to moderate size earthquakes. Benton County and its neighboring counties experienced approximately 4,200 earthquakes between 1969 and 2018. The largest concentrations of earthquakes occurred in the northwest corner of Benton County and the vicinity of Wooded Island in the Columbia River. A swarm of earthquakes near Wooded Island occurred in 2009, and a similar cluster occurred southeast of Prosser in 2000. The largest earthquake to occur as part of the Wooded Island and Prosser events had a magnitude of 3.0 (Benton County 2019).

Figure 3.2-5 shows earthquake epicenters surrounding the Lease Boundary. Earthquake epicenters are not known to have been located within the Lease Boundary. Earthquake data obtained from the Pacific Northwest Seismic Network indicate that 48 earthquakes of M_W <4 have had epicenters within about 20 miles of the Lease Boundary, with three epicenters of M_W 3 to 3.7 occurring adjacent to the Lease Boundary. Larger historical earthquakes greater than M_W 4 are unknown to have occurred in Benton County. Three earthquakes of M_W 4.3 occurred in 1979 and 1991, with epicenters located within 50 miles of the Lease Boundary (USGS n.d.[a]).

This Page Intentionally Left Blank

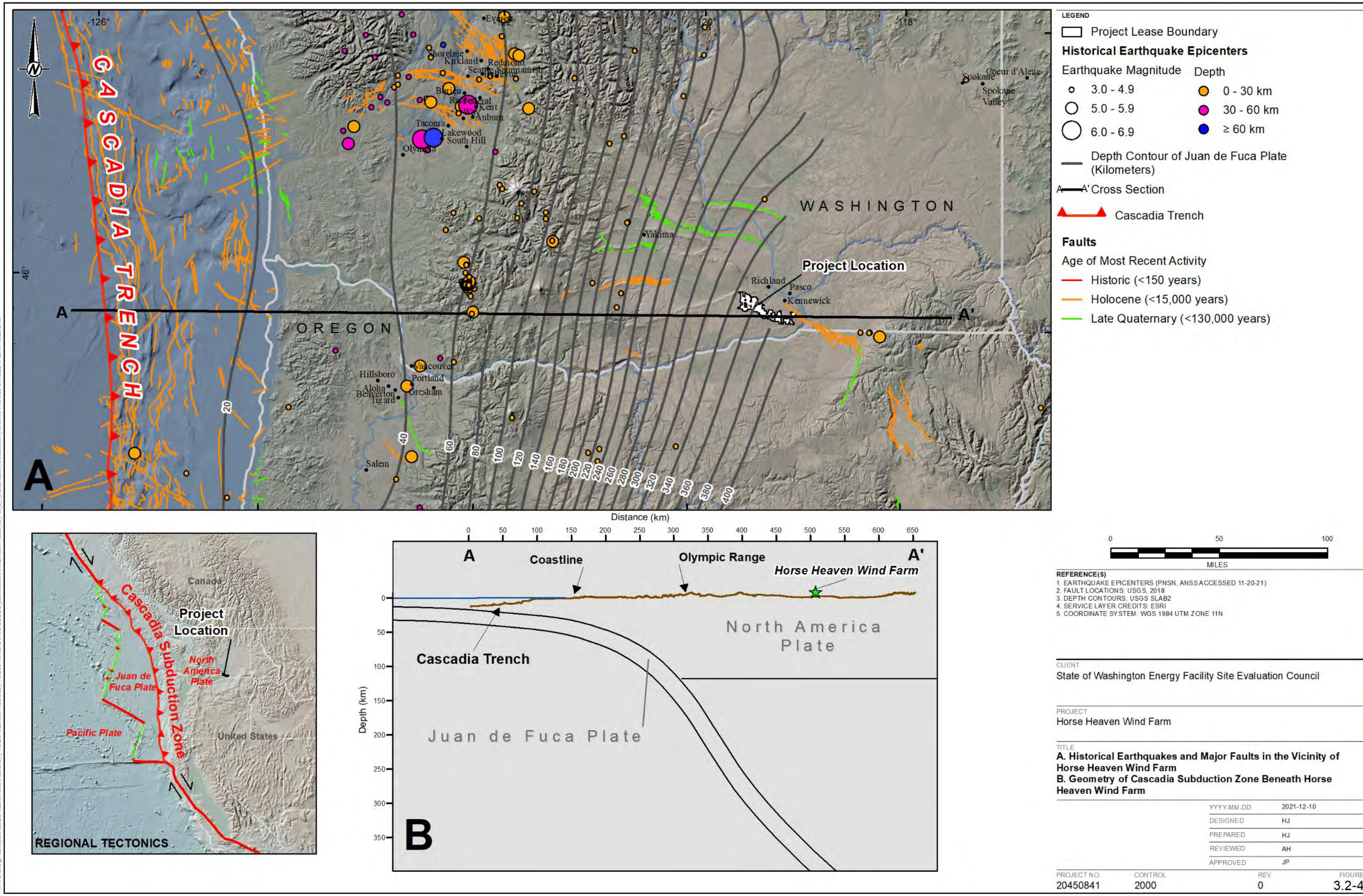


Figure 3.2-4: Tectonic Setting of the Pacific-Juan de Fuca-North American Plate Boundary Region

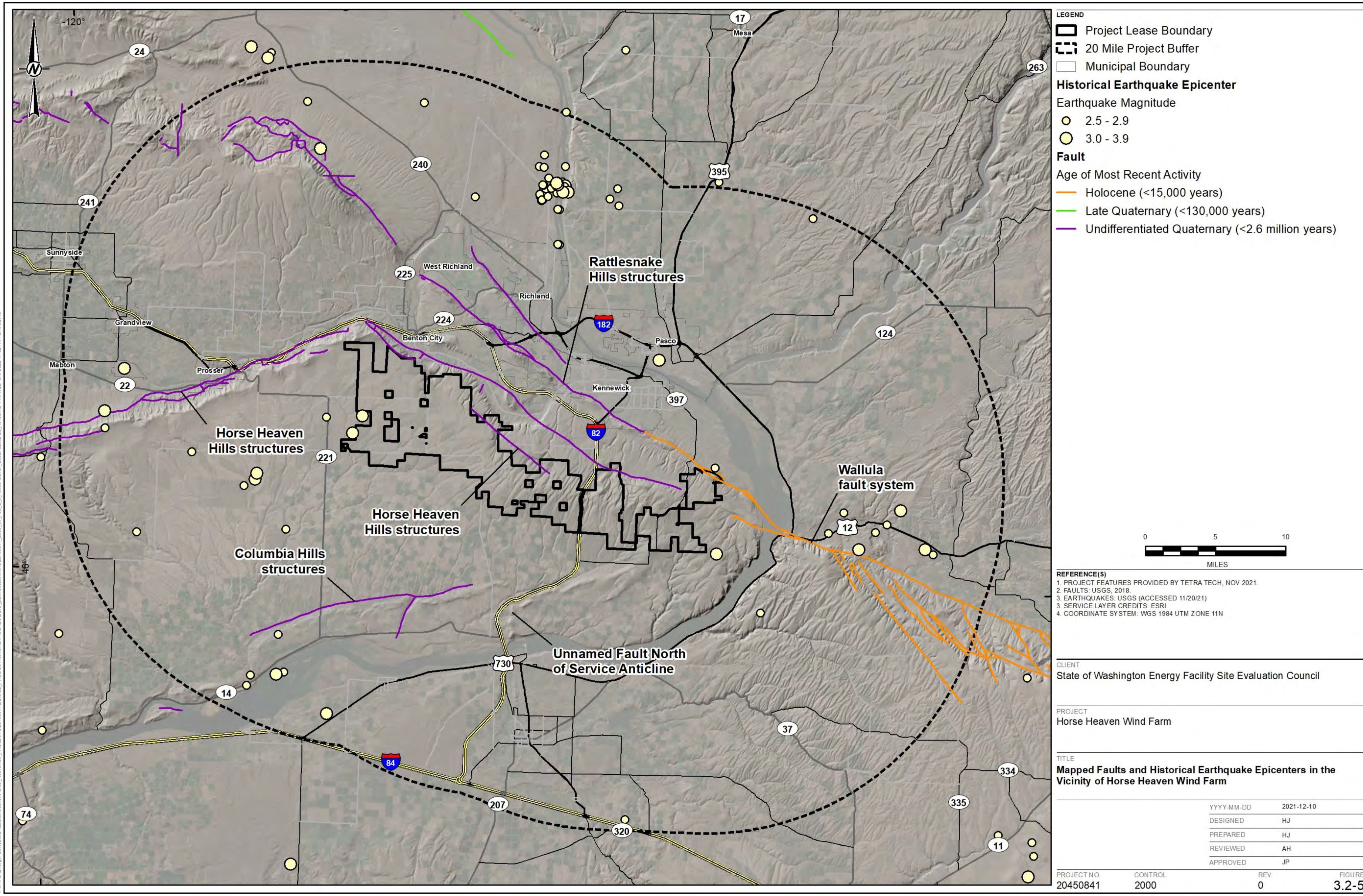


Figure 3.2-5: Earthquake Epicenters within the Project Region

The northeast- and northwest-trending, Quaternary (<2.6 million years old) thrust faults identified beneath the Horse Heaven Hills are present along the northern edge of the Lease Boundary. The northeast-trending faults underlying the Columbia Hills are located south of the Lease Boundary. To the southeast of the Horse Heaven Hills, and east of the Lease Boundary, are the northwest-trending, strike-slip faults of the Wallula fault system. The Wallula fault system is a prominent northwest-striking fault zone that extends from near Milton-Freewater, Oregon to near Kennewick, Washington. These fault locations are inferred, as accurate locations for the faults are not well known. The absence of mapped fault traces and instrumentally recorded earthquakes suggests that surface fault rupture is not a potential hazard within the Lease Boundary.

Strong Ground Shaking

Strong ground shaking from earthquakes is the most widespread hazard in the Pacific Northwest. Strong ground shaking during an earthquake can cause damage to engineered structures. Earthquake damage from shaking at a given location depends on:

- The structure of the earth between the earthquake source and the site (i.e., travel path)
- The properties of the near-surface soil and rock beneath the site
- The type, design, and construction of the structures subjected to the shaking

The intensity of earthquake ground motion is measured by several parameters. The horizontal peak ground acceleration (PGA) is the largest acceleration experienced by the ground at a given location during earthquake shaking. The U.S. Geological Survey (USGS) has developed the Unified Hazard Tool, which can be used to estimate a project-specific PGA and other important information used by engineers in designing facilities to resist earthquake shaking.

Properties that have a high risk of seismicity are in regions that have a 10 percent or greater probability of the maximum PGA equal to or greater than 0.15 gravity at any point in a 50-year period (Fannie Mae 2017). The USGS Unified Hazard Tool indicates that the Lease Boundary maintains a 2 percent probability of experiencing strong ground shaking within a 50 year-year period (USGS n.d.[b]).

Soil Liquefaction

Soil liquefaction is the temporary change of sandy soil from a solid state to a state with properties more like a liquid than a soil. Seismic liquefaction typically occurs when loose sandy or silty sand soils with poor drainage are saturated and experience strong ground shaking (Youd and Idriss 2001). Soils most prone to liquefaction are saturated, non-cohesive soils in areas that are frequently saturated near the ground surface. Soils susceptible to liquefaction are typically less than 50 feet bgs. Loose to medium dense sands, or soft to medium-stiff, low plasticity silts, are particularly susceptible to liquefaction because earthquake ground shaking can increase the pore pressures in the saturated soil materials.

The potential for liquefaction increases when ground shaking is prolonged. For example, megathrust subduction interface earthquakes tend to have more than 1 minute of strong shaking and are, therefore, more likely to induce liquefaction in susceptible soils. Liquefaction can result in ground settlement and sideways movement into surrounding areas along riverbanks or stream channels. This settlement can contribute to the loss of some bearing capacity for both shallow and deep foundations. Liquefaction-induced dynamic settlement and reduced bearing capacity can adversely affect structures.

Project-specific Hazard - Soil Liquefaction/Slope Failure/Lateral Spread

Soils most prone to liquefaction are saturated non-cohesive soils in areas that are frequently saturated near the ground surface (i.e., less than 50 feet bgs). The Applicant's preliminary geotechnical investigation report finds that the soils within the Lease Boundary are silts with varying amounts of sand extending from 5 to 60 feet bgs with no observable groundwater. The results presented in the ASC are in alignment with the USDA NRCS Soil Survey, which indicates that the soils within the Lease Boundary are generally well drained and that approximately 98 percent of the soils maintain moderate permeability and moderate runoff potential. Within the Lease Boundary, the Benton County Geologically Hazardous Areas Map shows restricted areas of moderate to high potential for liquefaction (Benton County 2021). These soils are inferred as soft to stiff, with soil Site Class D to E, as used in the 2018 IBC/ASCE 7-16 building code.

Tsunamis and Seiches

Tsunamis are long-duration (i.e., more than 20 minutes) ocean waves that are usually generated offshore by earthquakes, landslides, and volcanic eruptions that displace the seafloor. Tsunami waves can reach from a few feet to tens of feet in height and can inundate coastal and nearby low-lying inland areas. Tsunami risk is greatest near ocean shorelines and river mouths. Landslides generated on land that enter waterbodies with enough force to displace water can also cause localized tsunamis waves. These localized tsunamis can occur along rivers, lakes, or ocean shorelines.

Seiches are oscillating water waves that can occur in any enclosed or partially enclosed waterbodies such as lakes and rivers. Seiches are caused by earthquakes, volcanic activity, landslides, or extreme wind or weather events (USGS n.d.[c]). Seiches are hazardous when their extreme vertical waves approach shallow water or shorelines.

Project-specific Hazards – Tsunamis and Seiches

Coastal tsunamis are generated by earthquakes from the CSZ. They are not a potential hazard within the Lease Boundary as the Project is more than 250 miles from the Pacific Coast and 604 to 2,051 feet above mean sea level. Additionally, there are no major rivers or other perennial streams within the Lease Boundary.

After the 1964 Alaska earthquake, very minor (<1 foot) seiches were reported in the non-free-flowing upper section of the Columbia River system from McNary Reservoir (8 miles south of the site) to Franklin D. Roosevelt Lake (Grand Coulee Dam) (McGarr and Vorhis 1968). As previously noted, the Columbia and Yakima Rivers are topographically lower than the Lease Boundary and not subject to potential river and lake seiche effects.

Landslide Hazards

The USGS defines a landslide as the movement of a mass of rock, debris, or earth down a slope under the direct influence of gravity (USGS n.d.[d]). Landslide-caused disaster events within the State of Washington are a rare occurrence. Landslides are rare, but when they do occur, they have a major impact on the state's transportation systems, communities, and natural resources, causing severe property damage and loss of life. If the right conditions of soil, moisture content, and slope angle exist, landslides can occur on nearly any ground. Heavy rain, rapid snowmelt, flooding, earthquakes, vibrations, and other natural conditions or human-induced events can trigger a landslide (Benton County 2019).

The State of Washington has six landslide provinces: Olympic Mountains, Southwest Washington, Puget Lowland, Cascades, Columbia Plateau, and Okanogan Highlands. Benton County is part of the Columbia Plateau (Basin) landslide province. Landslides in this province include slope failures in bedrock along the soil interbeds and in the overlying catastrophic flood sediments and loess deposits. These landslides usually move along sediment interbeds within the Columbia River Basalts (Benton County 2019). Benton County experienced only one major landslide between 1984 and 2014. The Prosser landslide occurred in 1986 and 1987 during the construction of Interstate 82 when interstate construction remobilized several very large, prehistoric landslide complexes (DNR 2015).

General Landslide Hazards

Landslides include rockfalls, slides, slumps, and debris flows. Gravity is the dominant force behind landslides, but water, wind, or large-scale disturbances such as earthquakes or volcanic activity can also trigger landslides and slope failures. Steep and/or unstable slopes are at the greatest risk of producing landslides. Other factors that influence the probability of a slide include soil type and thickness, geological structure, vegetative cover, soil conditions and soil saturation, and the amount, rate, and duration of precipitation. Landslide hazard areas are typically defined as areas that, due to a combination of slope inclination, soil type, geological structure, and the presence of water, are susceptible to failure and subsequent downhill movement.

Project-specific Hazards - Landslide Hazards and Ground Instability

As illustrated in **Figure 3.2-6**, the Lease Boundary includes areas identified as susceptible to erosion, landslides, and bluff failures. Although the nearby City of Kennewick receives an average annual precipitation of 7.7 inches, the Applicant has identified two landslides just within the northern edge of the Lease Boundary (Horse Heaven Wind Farm, LLC 2021).

Ground instability can result from underground caves and voids in rocks. This type of instability can be particularly hazardous in places where karst features such as caves develop slowly, and rapid failures can result in several feet of instantaneous subsidence. Karst features generally develop in areas of water-soluble rock that dissolve over time. The USGS map of karst hazard potential in the United States does not show the Lease Boundary as having karst potential (Weary and Doctor 2014).

The basalt underlying the Lease Boundary and wider region is a volcanic rock without karst formations. Volcanic lava rocks can form voids or lava tubes; however, the Applicant's preliminary geotechnical investigation report did not indicate a sudden loss of core fluid that would be indicative of a void in the rock (Horse Heaven Wind Farm, LLC 2021).

Volcanic Hazards

Cascade Range volcanoes have produced more than 100 eruptions in just the past few thousand years. Cascade volcanoes have the potential to cause widespread disasters. As Cascade volcanoes erupt, they can produce the following adverse conditions:

- **Ashfall:** This effect results when ash is forcibly ejected by a volcanic explosion and becomes airborne. Volcanic ash can become suspended in the air and travel great distances from the volcanic vent, entrained by the wind, before falling to the ground.
- **Lahars:** This component of a volcanic eruption occurs when volcanic ash and other debris mix with a water source to form volcanic mudflows. Lahars are typically generated during and after significant eruptions, when large volumes of loose volcanic ash are present along the flanks of a volcano. Lahars may continue to mobilize loose debris for years after the event. Lahars are very fast-moving, capable of destroying bridges, roads, and other infrastructure along drainage paths.

- **Debris flows:** Like lahars, debris flows contain a higher concentration of volcanic debris, but with lower water content. Debris flows are not easily mobilized and are extremely dense, capable of causing significant damage.
- **Lava flows:** Lava flows are streams of molten rock that pour or ooze from an erupting vent. Lava erupts during either nonexplosive activity or explosive lava fountains.
- **Pyroclastic flows:** These flows are chaotic blasts of volcanic ash, hot gases, and rock debris, usually generated from the collapse of an eruption column. Pyroclastic flows can spread out in any direction from a volcanic vent at very high speeds and are not restricted to drainage channels, unlike lahars, debris flows, and lava flows.
- **Other Effects:** Massive landslides can occur if the portions of a volcano collapse during an eruption, as seen in the Mount St. Helens eruption in May 1980. Another hazard is the seismicity associated with volcanic activity, which may trigger earthquake events. Significant volcanic activity is generally preceded by weeks to months of increased seismicity. The Pacific Northwest is extensively monitored by the USGS and the Cascades Volcano Observatory with an advanced seismic network.

For example, Benton County experienced adverse impacts from the disbursement of ash from the May 18, 1980, eruption of Mount St. Helens as it caused major crop losses, interruptions in dairy production, and disruptions to the county's transportation system (Benton County 2019).

Regional Volcanic Hazards

The Cascade Range volcanic centers extend from Lassen Peak in northern California in the south to Mount Baker in Washington near the border with Canada in the north. The Cascade volcanoes are periodically active and can be expected to produce volcanic eruptions in the future (USGS n.d.[e]). The active volcanism is part of the subduction process of the Juan de Fuca plate beneath North America. The volcanoes in the Cascade Range have both effusive and explosive eruption histories with ashfall, lahars, debris flows, lava flows, pyroclastic flows, and landslides.

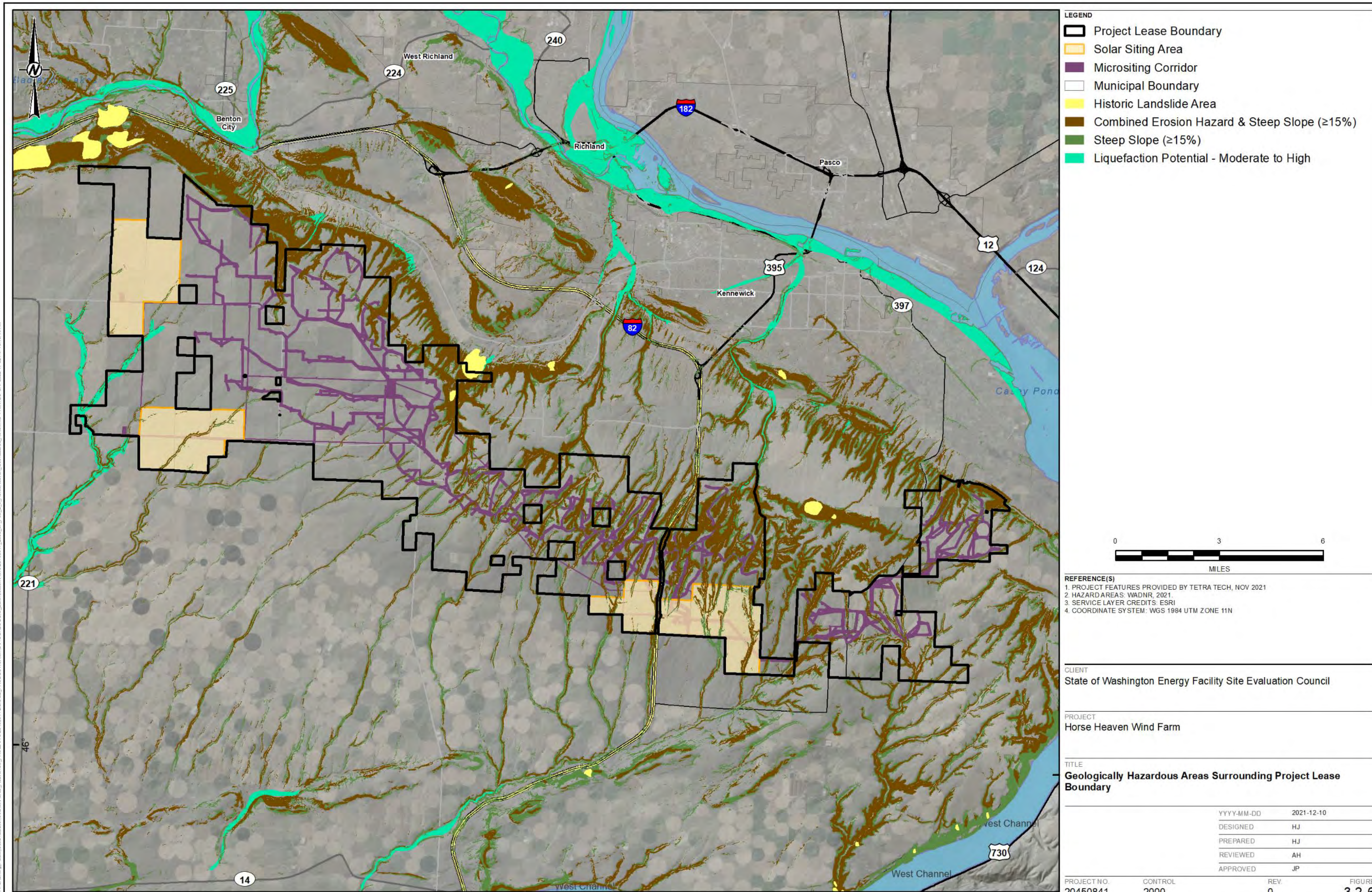


Figure 3.2-6: Geologically Hazardous Areas within the Project Vicinity

Project-specific Volcanic Hazards

The Lease Boundary is underlain by effusive basaltic lava flows, deposited a million years ago under a very different volcanic regime than currently exists. The volcanic vents that produced these lavas are no longer considered capable of generating new eruptions. Washington has five Cascade volcanoes that the USGS has listed as having a high or very high threat potential: Mount Baker, Glacier Peak, Mount Rainier, Mount St. Helens, and Mount Adams. **Figure 3.2-1** illustrates the location of these volcanoes in relation to the Lease Boundary. The two nearest volcanoes to the Lease Boundary are Mount Adams and Mount St. Helens, described below:

- **Mount Adams:** This volcano is approximately 90 miles west of the Lease Boundary. It has not been active in recent history, but it was active from about 520,000 to about 1,000 years ago. Eruptions have occurred from 10 vents since the last period of glaciation about 15,000 years ago.
- **Mount St. Helens:** Mount St. Helens is the closest historically active volcano to the Lease Boundary, at approximately 125 miles west of the Project site. Its most recent major eruption was in 1980, when it erupted and subsequently collapsed. The heaviest ash deposition occurred in a 60-mile-long swath immediately downwind of the volcano. Another area of thick ash deposition occurred near Ritzville in eastern Washington, about 195 miles from Mount St. Helens, where nearly 2 inches of ash blanketed the ground, more than twice as much as at Yakima, which is only about half as far from the volcano (Moen and McLucas 1981).

The Lease Boundary is located more than 80 miles from areas considered subject to volcanic hazards by the USGS (Washington Division of Geology and Earth Resources 2016). The potential hazard to the Lease Boundary from volcanic flow deposits is in part determined by the mapping of existing flows. The distribution of lahar deposits and lava flows associated with Mount Adams and Mount St. Helens has not historically reached the area near the Lease Boundary.

Renewed volcanic activity may trigger earthquakes, and volcanic ash could reach, and cover, the Lease Boundary from an eruption at one of the Cascade Range volcanoes. The main hazard from volcanic activity at the Lease Boundary is the deposition of volcanic ash following large eruptions in the Cascade Range. Prevailing wind directions in the Pacific Northwest blow toward the north and northeast. The USGS estimates a 0.1 to 0.2 percent annual probability of 4 inches or more ash accumulation near the Lease Boundary from an eruption of major Cascade volcanoes (Wolfe and Pierson 1995).

This Page Intentionally Left Blank

3.3 Air Quality

This section describes the existing air quality and regulatory setting in the proposed Horse Heaven Wind Farm (Project, or Proposed Action) vicinity. Section 4.3 presents an analysis of Project potential impacts on air quality. The Project vicinity includes the areas 4 miles south/southwest of Kennewick, Washington, in Benton County, and the larger Tri-Cities urban area along the Columbia River. The Project's consistency with relevant air quality standards, regulations, goals, and policies is evaluated in Section 4.3.

Regulatory Setting

Federal

The U.S. Environmental Protection Agency (EPA) regulates national air quality under the Clean Air Act (CAA), the primary federal statute governing air quality. The EPA has established National Ambient Air Quality Standards (NAAQS) for six criteria pollutants:

- Carbon monoxide (CO)
- Nitrogen dioxide (NO_2)
- Particulate matter less than 10 microns (PM_{10})
- Particulate matter less than 2.5 microns ($PM_{2.5}$)
- Ozone (O_3)
- Sulfur dioxide (SO_2)
- Lead (Pb)

The NAAQS are designed to protect public health and welfare with an adequate margin of safety. NAAQS are expressed in concentration levels in ambient air, averaged over a specific time interval. Washington ambient air quality standards are identical to the NAAQS (see Washington Administrative Code [WAC] 173-476, Ambient Air Quality Standards). Local air quality is measured relative to these national and state standards. Areas that comply with the NAAQS are designated "attainment areas." Areas that fail to meet the standards are designated "non-attainment" areas.

Under the CAA, the EPA requires each state to prepare, adopt, and administer a State Implementation Plan (SIP) to ensure that air quality in non-attainment areas is gradually brought into compliance with the NAAQS and that good air quality is maintained in areas that already attain the NAAQS. The SIP must consider the impact of both stationary and nonstationary sources of air pollution. In Washington, the Department of Ecology (Ecology) is the agency generally responsible for the SIP and overall air quality management.

State

The Washington Energy Facility Site Evaluation Council (EFSEC) has overarching responsibility for air quality standards compliance for energy facilities pursuant to Washington Administrative Code (WAC) 463-62-070:

"Air emissions from energy facilities shall meet the requirements of applicable state air quality laws and regulations promulgated pursuant to the Washington State Clean Air Act, chapter 70.A.15 RCW, and the Federal Clean Air Act (42 U.S.C. 7401 et seq.), and chapter 463-78 WAC."

In addition, 463-78 WAC adopts several provisions from WAC 173-400 regulations including key applicable provisions discussed in Section 3.3.1.2 below.

Local

The Benton County Clean Air Agency (BCAA) has local rules and regulations for potential sources of air pollution which are subsumed under EFSEC review for energy facilities.

Stationary Source Regulations

The SIP developed by Ecology and EFSEC includes both prohibitory rules (e.g., emission limits) for existing stationary sources of air pollution and rules for permitting new stationary sources of air pollution in both attainment and non-attainment areas of the state. Local air authorities, such as the Benton County Clean Air Agency (BCAA), may impose additional requirements. The State of Washington Energy Facility Site Evaluation Council has EPA-delegated authority for issuance of air permits for energy facilities under its jurisdiction pursuant to WAC 463-78-095.

Any new stationary emissions source that exceeds certain thresholds must generally obtain a preconstruction air quality permit by demonstrating that it would comply with all applicable federal, state, and local air quality requirements, including emissions standards and ambient air quality standards.

New sources of air emissions in non-attainment areas must generally satisfy more rigorous requirements than equivalently sized sources in attainment areas to bring the area back into compliance with air quality standards. The two most common permits associated with regulated air pollutants emitted by stationary industrial activity are Notice of Construction/New Source Review approvals, and Prevention of Significant Deterioration permits.

The Project would not be located within a non-attainment area for any criteria pollutants (EPA 2020a). The only possible stationary sources of emissions associated with the Project are a potential portable concrete batch plant and temporary backfeed power generators. Neither would be permanent sources of air pollution. A Notice of Construction approval and supplemental environmental analysis which would include air quality assessment would be required if either the batch plant or the generators are ultimately included in the final development.

Nonstationary and Fugitive Emission Source Regulation

Although construction emissions are not included in the permitting of stationary sources, mobile sources (such as construction equipment and maintenance pickups) are regulated separately under the federal CAA. Nonstationary emission sources, such as ships, trains, motor vehicles, and on-road and off-road construction equipment, are not generally required to obtain preconstruction air quality permits. Instead, nonstationary emission sources may be required to comply with mobile source emission standards established by the EPA. Mobile source regulations generally apply to mobile source equipment manufacturers prior to sale, who must certify that their equipment complies with applicable standards.

Washington State and the BCAA regulate “fugitive” air emissions not emitted through a chimney, smokestack, or similar facility. A common example of fugitive air emissions is dust blowing from construction sites, unpaved roads, and tilled agricultural fields. Wind and solar energy plants are not included among the facilities for which review and permitting of fugitive emissions are required (WAC 173-400). Nevertheless, WAC 173-400-040(9)(a) requires owners and operators of fugitive dust sources to take reasonable measures to prevent dust from becoming airborne and minimize emissions.

Other Washington State regulations that apply to nuisance emissions, including fugitive dust, and various equipment used during construction, include:

- WAC 173-400-040(3) Fallout. Prohibits emission of particulate matter from any source to be deposited beyond the property line in quantities that would interfere with the use and enjoyment of the impacted property
- WAC 173-400-040(4–4a) Fugitive emissions. Requires reasonable precautions to prevent the release of air contaminants from materials handling, construction, demolition, or other fugitive emissions sources
- WAC 173-400-040(5) Odors. Requires good practice and procedures to minimize odors that may interfere with another property owner's use and enjoyment of their property

In addition to the above, the BCAA requires (prior to commencement of construction):

- Notification of any work that would generate fugitive air emissions (BCAA Regulation 1 Article 4 Section 4.02.D)
- Preparation and implementation of a dust control plan that identifies management practices and operational procedures to control fugitive dust emissions (BCAA Regulation 1 Article 4 Section 4.02.E)

Climate Change – Greenhouse Gas Emissions

Greenhouse gases (GHGs) absorb infrared radiation in the atmosphere. The infrared radiation is selectively absorbed or "trapped" by GHGs, and heat is then reradiated back toward the earth's surface, warming the lower atmosphere and the earth's surface. Atmospheric concentrations of GHGs have risen dramatically since the Industrial Revolution. This has resulted in gradually increasing global temperature, thereby increasing the potential for indirect effects such as:

- Decrease in precipitation as snow
- Gradual melting of polar ice caps
- Increase in severe weather
- Changes to plant and animal species and habitat
- Rise in sea level

Climate impacts are not attributable to any single action but are exacerbated by diverse individual sources of emissions that each make relatively small additions to GHG concentrations.

Both natural processes and human activities emit GHGs. Human activities known to emit GHGs include industrial manufacturing, utilities, transportation, residential activities, and agricultural activities. The GHGs that enter the atmosphere because of human activities are CO_2, methane, nitrous oxide, and fluorinated carbons (hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride).

In 2020, the Washington Legislature set new GHG emission limits in order to combat climate change. Under the law, the state is required to reduce emissions levels as follows:

- 2020 – reduce to 1990 levels
- 2030 – reduce to 45 percent below 1990 levels

- 2040 – reduce to 70 percent below 1990 levels
- 2050 – reduce to 95 percent below 1990 levels and achieve net-zero emissions (Ecology n.d.)

In 2022, the Washington Legislature set a new rule, Chapter 173-446 WAC, Climate Commitment Act Program. The Climate Commitment Act requires Ecology to adopt rules to implement the cap-and-invest program to achieve Washington's goal of net zero greenhouse gas emissions by 2050 (Ecology n.d.).

WAC 173-441 establishes an inventory of GHG emissions through a mandatory GHG reporting rule for certain operations. Because wind and solar power do not emit GHGs during operations, these regulations would not apply to the Project (Horse Heaven Wind Farm, LLC 2021a).

3.3.1 Affected Environment

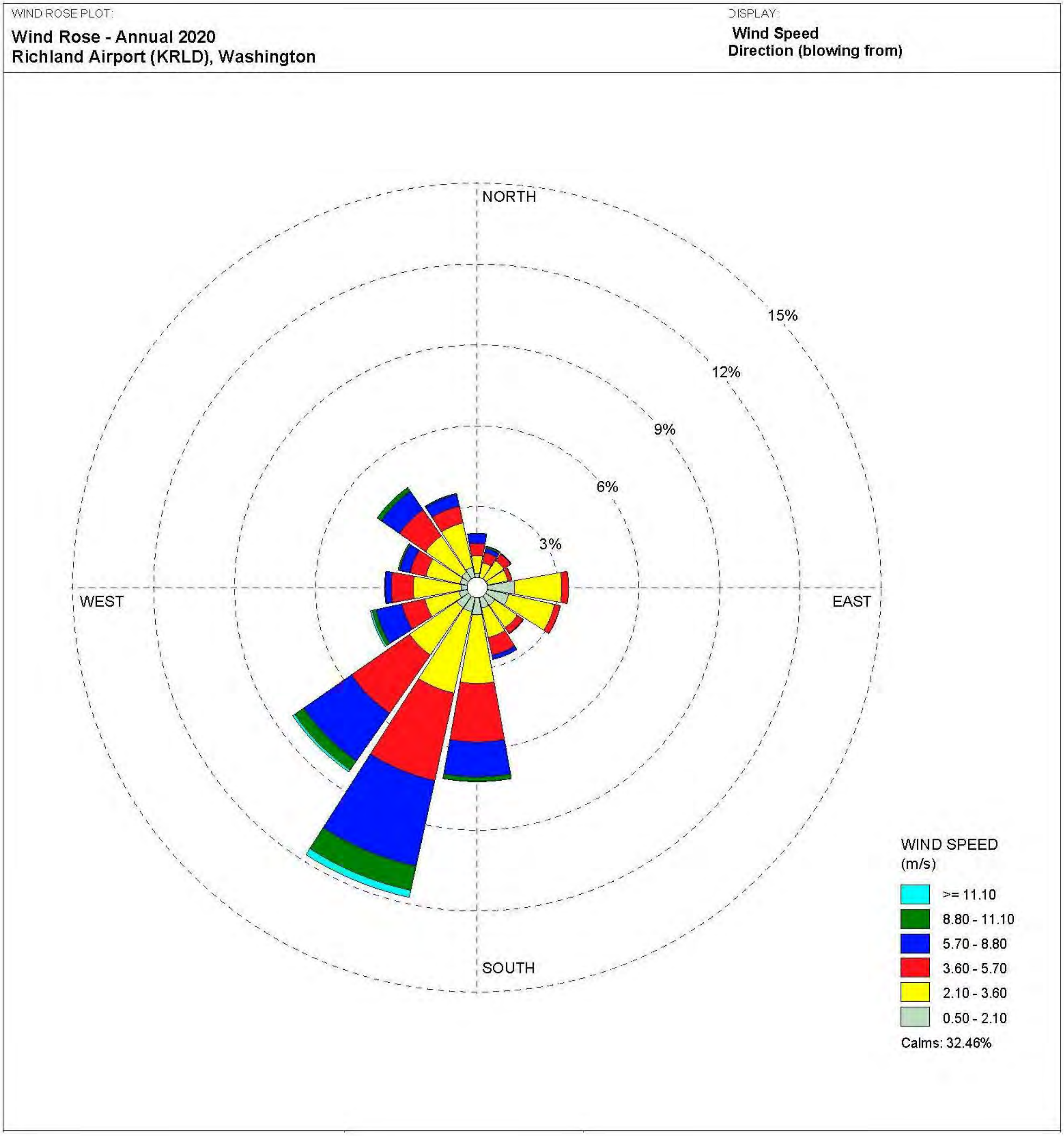
The following subsections discuss regional climate, emission inventory, and air quality conditions in the Project vicinity.

3.3.1.1 Regional Climate

Benton County is located within a rain shadow created by the Cascade Mountains, which causes a decrease in precipitation to the east. In this region of Washington, the summers are hot and mostly clear, winters are cold and partly cloudy, and it is typically dry year-round (on average, there are nearly 200 days of sunshine). The average annual precipitation at Kennewick, one of the cities closest to the Lease Boundary, is 7.7 inches. In winter, temperatures in Kennewick average a high of 43 degrees Fahrenheit (°F) and a low of 29.6°F, with extreme lows below 10°F. In summer, temperatures average a high of 87.1°F and a low of 59.6°F, with extreme highs above 100°F. The average relative humidity is 64 percent (Horse Heaven Wind Farm, LLC 2021a).

Wind speed, wind direction, and atmospheric stability strongly influence air quality conditions. Stronger winds improve local ventilation rates, increase atmospheric mixing, and generally improve dispersion of local point source emissions. However, higher winds can also contribute to windblown fugitive dust. **Figure 3.3-1** and **Figure 3.3-2** depict wind speed, wind direction, and stability parameter observations taken from the Richland, Washington meteorological station (KRLD), which is the closest station to the Project (Horse Heaven Wind Farm, LLC 2021b). The annual information provided in these figures is based on one full year of data from 2020.

Figure 3.3-1 shows the average annual wind speed and direction for the year 2020 in Richland, in a graphic form known as a “wind rose.” The rings in this figure represent the percentage of the year that the wind blows from each of 16 compass directions, with color-coded bands depicting wind speed categories within each compass direction. Wind in the Project vicinity blows predominantly from the southwest quadrant, with wind from other directions possible less frequently.

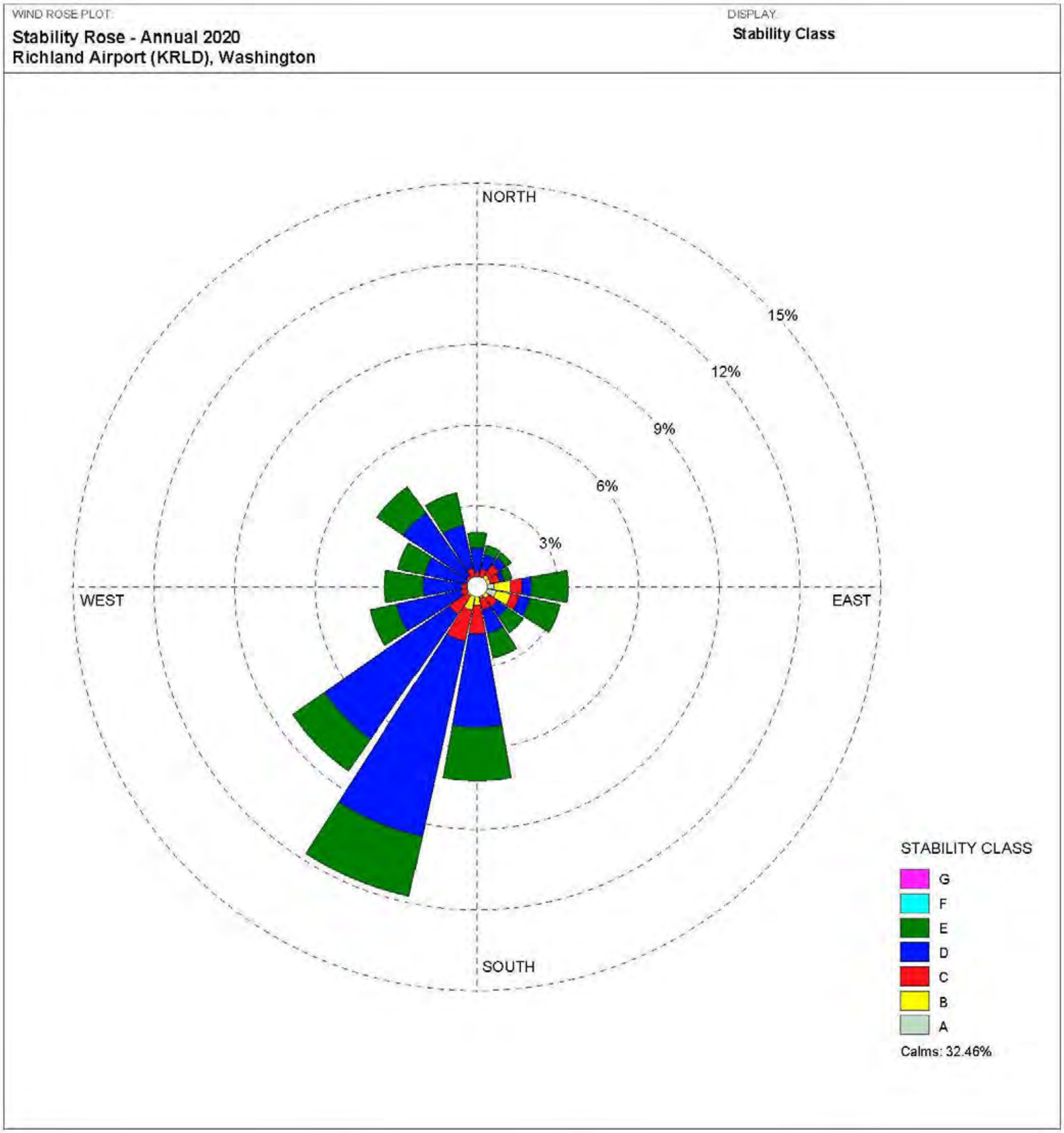


Source: Horse Heaven Wind Farm, LLC 2021b

Figure 3.3-1: 2020 Wind for Richland, Washington, Meteorological Station

Wind conditions near the Lease Boundary over a longer period can be characterized by Automated Surface Observing Systems (ASOS), which serve as the nation's primary surface weather observing network. The closest ASOS station to the Lease Boundary is located at the Tri-Cities Airport in Pasco, Washington (KPSC). Based on data collected from January 1, 1990, to December 31, 2019, the prevailing winds most frequently blow from the southwest (approximately 24 percent of the time) and the north-northwest (approximately 24 percent of the time), with calm conditions (less than 2.0 miles per hour) occurring approximately 23 percent of the time. The average wind speed for this period was approximately 6.7 miles per hour (3.0 meters per second) (Horse Heaven Wind Farm, LLC 2021a).

Atmospheric stability, which refers to a lack of vertical air movement, plays an important role in air quality because air contaminants are not dispersed as quickly or widely when the atmosphere is stable (Hanna et al. 1982). Atmospheric stability is generally characterized according to the Pasquill-Gifford scheme, which ranges from Class A (most unstable) to Class G (most stable). **Figure 3.3-2** shows the average atmospheric stability in Richland 2020. Similar to the wind rose in **Figure 3.3-1**, in this "stability rose," the spokes in the figure depict wind direction, but here the colors represent the atmospheric stability associated with each wind direction. The figure shows that unstable to neutral (Class A–D) atmospheric conditions, which promote acceptable pollutant dispersion, predominate in all compass directions in the Richland area and that highly stable conditions (Class F and G) with reduced atmospheric mixing are less frequent.



Source: Horse Heaven Wind Farm, LLC 2021b

Figure 3.3-2: 2020 Atmospheric Stability for Richland, Washington, Meteorological Station

3.3.1.2 Existing Air Quality

Background air quality conditions in the Project vicinity are somewhat difficult to determine because there are no comprehensive air quality monitors near the Lease Boundary. The monitors nearest to the Lease Boundary are located in Kennewick, Washington (with the monitor located approximately 4 miles to the north), which measure ozone and PM_{10}. The nearest $PM_{2.5}$ monitors are in Pendleton, Oregon (approximately 35 miles southeast of the Lease Boundary) and Toppenish, Washington (approximately 40 miles northwest of the Lease Boundary). The nearest SO_2 monitor is in Wenatchee, Washington (approximately 80 miles north of the Lease Boundary). The nearest CO monitor is in Portland, Oregon (approximately 155 miles west-southwest of the Lease Boundary). The nearest NO_2 monitors are in Tacoma, Washington (approximately 157 miles northwest of the Lease Boundary) and Portland, Oregon (approximately 157 miles west-southwest of the Lease Boundary). The nearest lead monitor to the site that collected data for the three-year period 2018–2020 is located in Chico, California (approximately 450 miles south of the Lease Boundary) (EPA 2020b). Air quality data for monitors near the Lease Boundary with complete records for 2018–2020 are summarized in **Table 3.3-1** (Horse Heaven Wind Farm, LLC 2021b).

Based on the air quality data that have been collected, as well as regional air quality trends, the EPA has not designated Benton County, Washington, as a non-attainment area for any criteria air pollutant.

Table 3.3-1: Background Air Quality Data from Monitoring Stations near the Lease Boundary

Pollutant	Averaging Period	Units	Monitor Site	Measured Concentration[a]				NAAQS
				2018	2019	2020	Avg.	
CO	1-hour	ppm	Portland - SE Lafayette (41-051-0080)	1.9	1.8	15.1	6.3	35[b]
	8-hour	ppm		1.6	1.6	14.1	5.8	9[b]
NO_2	1-hour	ppb	Portland - SE Lafayette (41-051-0080)	35.4	31.5	29.4	32.1	100[c]
	Annual	ppb		8.6	7.7	6.4	7.6	53[d]
Ozone	8-hour	ppm	Kennewick S Clodfelter Road (53-005-0003)	0.073	0.061	0.061	0.065	0.070[e]
$PM_{2.5}$	24-hour	μg/m³	Toppenish - Ward Rd (Yakama Tribe) (53-077-0015)	50.4	34.4	90	58.3	35[f]
	Annual	μg/m³		11.1	9.8	14.5	11.8	12.0[g]
SO_2	1-hour	ppb	Portland - SE Lafayette (41-051-0080)	2.8	2.5	2.3	2.5	75[h]
	3-hour	ppb		2.4	2.6	2.2	2.4	500[i]
Lead	Rolling 3-month	μg/m³	Chico, CA - Chico-East Avenue (06-007-0008)	0.0935	0.0033	0.0026	0.0331	0.15[j]
PM_{10}	24-hour	μg/m³	Kennewick - Metaline (53-005-0002)	65	566	88	240	150[k]

Source: Horse Heaven Wind Farm, LLC 2021b – data compiled from EPA AirData tool, https://www.epa.gov/outdoor-air-quality-data

Notes:

(a) All concentrations are presented in the same statistical form as the corresponding NAAQS standard, as noted below.
(b) Not to be exceeded more than once per year. Values shown are for the maximum second highest value in each year.
(c) 98th percentile of 1-hour daily maximum concentrations, averaged over 3 years.
(d) Annual mean.
(e) Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years.
(f) 98th percentile, averaged over 3 years.
(g) Annual mean, averaged over 3 years.
(h) 99th percentile of 1-hour daily maximum concentrations, averaged over 3 years.
(i) Not to be exceeded more than once per year. Values shown are for the maximum second highest value in each year.

Table 3.3-1 notes, continued

(j) Not to be exceeded. Values shown are for the maximum quarterly average value in each year.

(k) Not to be exceeded more than once a year on average over 3 years. Values shown are for the maximum second highest value in each year. 2019 high concentration and 3-year average are likely influenced by wildfires in the area.

Avg. = average; CO = carbon monoxide; μg/m^3 = micrograms per cubic meter; NAAQS = National Ambient Air Quality Standards; NO_2 = nitrogen dioxide; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than 10 microns in diameter; ppb = parts per billion; ppm = parts per million; SO_2 = sulfur dioxide

3.3.1.3 Regional Emissions

Air quality in the Project vicinity is influenced by, and can be correlated to, regional emissions. Accordingly, collection of regional emissions data is a key and necessary component of air quality planning by state and regional agencies responsible for attaining and maintaining ambient air quality standards. Emission sources in Benton County are regularly tabulated and reported by Ecology for five of the six criteria air pollutants (except lead) in 24 source categories that include both natural and man-made sources. The most recently published emission inventory for Benton County (for the year 2017) is provided in **Table 3.3-2**.

Table 3.3-2: 2017 Emissions Inventory for Benton County, tons per year

Source Category	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_2	VOCs
Aircraft	122	1	3	2	0	3
Nonroad Equipment and Vehicles - Boats	889	60	4	3	0	259
Dust from Construction	-	-	5,265	526	-	-
Industrial/Commercial/Institutional Fuel Combustion	123	121	57	43	18	7
Residential Non-Wood Fuel	22	52	0	0	1	3
Fertilizer Application	-	-	-	-	-	-
Commercial Cooking	35	-	89	83	-	13
Livestock	-	-	323	67	-	37
Miscellaneous	57	1	12	10	0	104
Natural Emissions from Soil and Vegetation	1,307	111	-	-	-	3,078
Nonroad Equipment and Vehicles	4,049	674	63	61	1	304
Agricultural Burning	946	56	148	141	2	123
Residential Outdoor Burning: Yard Waste, Trash	227	6	40	39	4	25
Silivicultural Burning	15	1	3	3	0	4
On-road Mobile	14,881	2,911	154	86	7	1,658
Nonpoint Gasoline Stations, Storage, and Marketing	-	-	-	-	-	340
Large Point Sources	146	254	51	37	9	49
Dust from Roads	-	-	1,331	222	-	-
Locomotives	256	1,110	28	27	1	47
Residential Wood Combustion	677	10	77	77	2	104
Commercial Marine Vessels	-	-	-	-	-	-

Table 3.3-2: 2017 Emissions Inventory for Benton County, tons per year

Source Category	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_2	VOCs
Nonpoint Solvent Use	-	-	-	-	-	4,024
Dust from Agricultural Tilling and Harvesting	-	-	6,207	1,221	-	-
Wildfires	5,711	141	638	540	62	1,365
Total	29,463	5,510	14,493	3,190	106	11,548

Source: Ecology 2020
Notes (general):
1. Emissions inventory for 2017 is the most current year for which published data is available
2. Emissions are reported in whole numbers. Where a value of 0 is reported, emissions are less than 0.5 tons per year.
"-" = no emissions were reported for this pollutant for this source category
NO_X = oxides of nitrogen; PM_{10} = particulate matter less than 10 microns in diameter; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; SO_2 = sulfur dioxide; VOC = volatile organic compound

As **Table 3.3-2** shows, most emissions of oxides of nitrogen (NO_X) and CO—pollutants that result primarily from combustion—in Benton County come from mobile sources. On- and off-road, boats, aircraft, and locomotives account for about 85 and 70 percent of all NO_X and CO emissions, respectively. Natural sources and wildfires together account for about 6 and 24 percent of countywide NO_X and CO emissions, respectively. Large point sources of air pollution, on the other hand, account for less than 1 percent of countywide CO emissions and less than 5 percent of countywide NO_X emissions.

Volatile organic compounds (VOCs), together with NO_X, are the primary precursors to ozone, which is not emitted directly but rather formed in the atmosphere as a result of sunlight, heat, and complex photochemical reactions. Natural sources and wildfires together account for nearly 40 percent of countywide VOC emissions. Solvent use accounts for about 35 percent of Benton County VOC emissions, and mobile sources account for about 20 percent.

Fugitive dust from agricultural operations, construction activity, and roadways accounts for the majority of PM_{10} and $PM_{2.5}$ emissions in the county—about 88 and 62 percent, respectively. Wildfires are also an important source of PM_{10} and $PM_{2.5}$ emissions in the county, accounting for about 4 and 17 percent, respectively.

3.4 Water Resources

This section describes existing water resources within the proposed Horse Heaven Wind Farm (Project, or Proposed Action) Lease Boundary. Section 4.4 provides an analysis of the Project's potential impacts on water resources. The following water resources are addressed herein:

- Surface water and wetlands
- Runoff/absorption
- Floodplains
- Groundwater
- Public water supply

Regulatory Setting

The applicable federal, state, and county laws and regulations relevant to water resources are provided in Section 4.4.

Methodology

The spatial boundaries of the water resources affected environment are the same as the Project's Lease Boundary. The description of the affected environment provided in Section 3.4.2 is based on information available in the Application for Site Certification (ASC) from Horse Heaven Wind Farm, LLC (Applicant) and additional information provided by the Applicant through data requests for preparation of the Draft Environmental Impact Statement, as well as available government and publicly available literature.

3.4.1 Affected Environment

The Lease Boundary is located in Benton County, in eastern Washington. Benton County falls within the rain shadow of the Cascade Mountains, which creates dry conditions year-round. The average annual precipitation for the nearest community, the City of Kennewick, is approximately 7.7 inches (U.S. Climate Data 2021). The average annual snowfall is approximately 1 inch (U.S. Climate Data 2021). Summers are hot and mostly clear, while winters are very cold and partly cloudy (Horse Heaven Wind Farm, LLC 2021). The annual high temperature is 66 degrees Fahrenheit (°F), with annual low temperatures of 44°F (U.S. Climate Data 2021).

The Lease Boundary is located in an upland area dominated by agricultural activity with no irrigated crops (Tetra Tech 2021). Water resources in the area are limited. The Lease Boundary falls within the Rock – Glad watershed (Water Resource Inventory Area [WRIA] 31) and the Lower Yakima watershed (WRIA 37) (Ecology 2021). Watersheds and water resources are shown in **Figure 3.4-1.** The majority of the Lease Boundary drains toward the Columbia River, with the exception of a small area that drains north toward the Yakima River (Horse Heaven Wind Farm, LLC 2021).

This Page Intentionally Left Blank

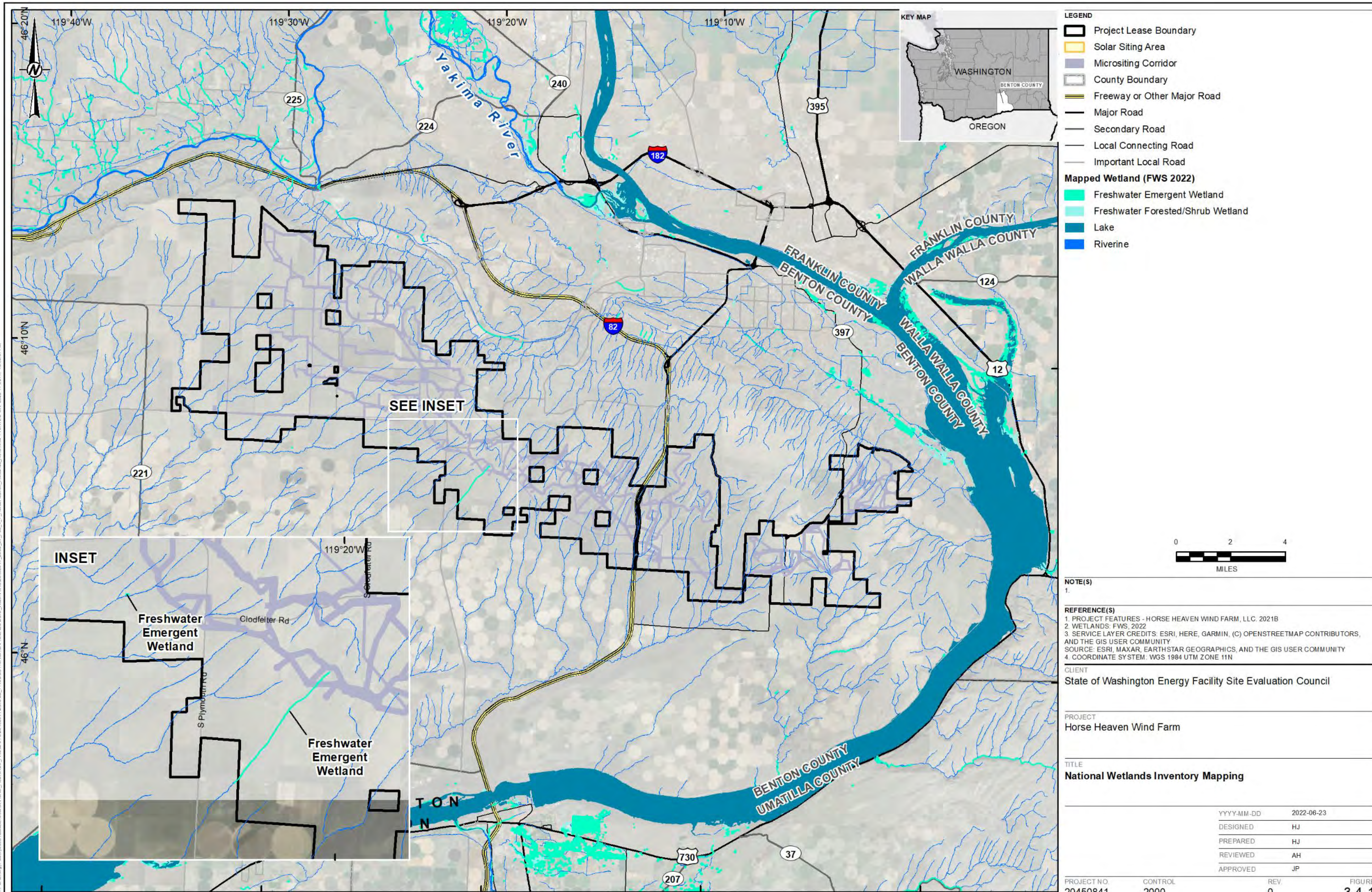


Figure 3.4-1: Watersheds and Water Resources in the Project Lease Boundary

3.4.1.1 Surface Water and Wetlands

The study area used by the Applicant for the background review of water resources comprised an area of approximately 21,680 acres and included the Wind Energy Micrositing Corridor and Solar Siting Areas. The background review completed by the Applicant is summarized below (Horse Heaven Wind Farm, LLC 2021).

- No hydric soils were identified in the Lease Boundary, based on Natural Resource Conservation Service data.
- Desktop review of the Washington Natural Heritage Program for high-quality wetlands did not identify any high-quality wetlands within the Lease Boundary.
- The National Hydrography Dataset and the Benton County Critical Area Ordinance fish and wildlife habitat conservation areas map identified 253 intermittent streams within the Lease Boundary (Ecology 2019; Benton County n.d.). No perennial streams are located within the Lease Boundary.
- No impaired or threatened waterbodies, as defined on the Washington State Department of Ecology 303(d) or 305(b) list, occur within the Lease Boundary (Ecology 2020).
- The Applicant notes that the U.S. Geological Survey Washington Current Water Condition data do not include any water quality conditions within the Lease Boundary. No water quality monitoring stations are located within the Lease Boundary; however, three are located within the downstream environment of the Lease Boundary (USGS 2022). One station is located on the Yakima River (Site 12510500 Yakima River at Kiona), and two are located on the Columbia River (Site 14019220 Columbia River at McNary Dam Lock and Site 14019240 Columbia River below McNary Dam) (USGS 2022).
    - Yearly Freshwater Quality Index (WQI) for the Yakima River at the Kiona site in 2019 was rated moderate concern with a score of 61.[2] Fecal coliform bacteria, oxygen levels, pH, and temperature were all rated as good, indicating that they meet expectations relative to the given conditions, while suspended solid, total persulfate nitrogen, total phosphorus, and turbidity were rated as moderate concern (Ecology 2020, 2022a).[1]
    - Yearly WQI for the Columbia River above the McNary Dam site is not available (Ecology 2022a).
    - Yearly WQI for the Columbia River below the McNary Dam site in 2019 was rated as good, with a score of 89. All yearly parameter scores were rated as good, including levels of fecal coliform bacteria, oxygen, pH, suspended solids, temperature, total persulfate nitrogen, total phosphorus, and turbidity (Ecology 2022a).
- The Lease Boundary includes areas identified as susceptible to erosion, landslides, and bluff failures.
- The Applicant reported no wetlands within the study area. Based on independent review, data available from the National Wetlands Inventory indicate that there are two freshwater emergent wetlands and/or palustrine features within the Lease Boundary, one of which crosses the Wind Energy Micrositing Corridor (USFWS 2021).

---

[2] Ecology's Freshwater Quality Index (WQI) assigns a score of 1 to 100, with higher numbers indicating better water quality. A WQI of 80 and greater is given a rating of "good," indicating that the combined water quality conditions meet expectations relative to the given conditions and the water quality is of lowest concern. A score of 40 to 80 is rated "moderate concern." A score of 40 and below is rated "poor," indicating that the water quality does not meet expectations and these sites are of highest concern (Ecology 2020, 2022b).

The Applicant conducted wetland delineation surveys and surveys for non-wetland surface water in February, August, October, and November 2020 within the Lease Boundary. Additional surveys were completed in May 2021 within the Lease Boundary. In total, approximately 21,680 acres were surveyed for wetlands and other waters, with an emphasis on areas within the Wind Energy Micrositing Corridor and Solar Siting Areas (Appendix I, Horse Heaven Wind Farm, LLC 2021; Tetra Tech 2021). Plant species names and associated wetland indicator status ratings are from the State of Washington 2016 Wetland Plant List (Lichvar et al. 2016). Findings from the field surveys are summarized below (Horse Heaven Wind Farm, LLC 2021; Tetra Tech 2021):

- No wetlands within the Wind Energy Micrositing Corridor and Solar Siting Areas were identified during field surveys.
- One wetland, surveyed in May 2021, was identified within the Lease Boundary approximately 240 feet west of the Wind Energy Micrositing Corridor in Badger Canyon and is approximately 0.03 acres in size (Wetland ID: E10). The location of the wetland relative to the Micrositing Corridor is displayed in **Figure 3.4-2**. The wetland is located downslope from the Micrositing Corridor. It is described as a depressional wetland, and further details from the U.S. States Army Corps of Engineers data sheet are provided below (Tetra Tech 2021):
  - The wetland is a depressional wetland located in a valley bottom downslope from the Micrositing Corridor. A spring with a well underneath a balsam poplar (*Populus balsamifera*) tree occurs within the site.
  - The wetland is located in the Ritzville Silt Loam soil map unit. Slope gradient on site is approximately 30 to 65 percent.
  - The soil profile on site is a sandy loam texture. Hydric soils and wetland hydrology indicators are present, including a hydrogen sulfide odor. Depth to bedrock is approximately 12 inches.
  - Hydrophytic vegetation is present on site. Dominant species include balsam poplar and common horsetail (*Equisetum arvense*), with some cover of Great Basin ryegrass (*Leymus cinereus*). All species are categorized as facultative species in the Arid West (USACE 2020). "Facultative" describes species that are found in wetland and non-wetland ecosystems (Lichvar et al. 2012).
  - Surface water was not present at the time of the survey, and the water table was not encountered; however, water saturation was present at a depth of 0 inches (i.e., surface).
  - The wetland was rated as a Category IV wetland based on function. Wetlands in Washington are provided a category rank based on their sensitivity to disturbance, rarity, functional value, and whether they are replaceable (Hruby 2014). Wetlands are ranked from Category I, being the most rare, sensitive, undisturbed, or irreplaceable to Category IV wetlands, which have the lowest functional value and are often heavily disturbed (Hruby 2014).
  - Disturbance was identified within the wetland area. The site was previously used as a water trough for cattle, and evidence of cattle grazing was observed at the site.
- Field surveys in the Wind Energy Micrositing Corridor and Solar Siting Areas mapped two intermittent streams and 31 ephemeral stream channels, all of which are considered waters of the state. The ephemeral and intermittent streams are depicted in **Figure 3.4-3**. Stream acreage within the field survey study area was calculated to be 2.58 acres based on the average length and width of streams (Tetra Tech 2021). Ephemeral streams flow only during, or immediately following, precipitation events, and stormwater is their main source of water (Nadeau 2015). An intermittent stream contains water for only a portion of the year—typically,

seasonally during winter and spring when the channel is below the water table or when snowmelt provides sustained flow (Nadeau 2015).

The location of streams within the Lease Boundary based on field surveys (Tetra Tech 2021) was compared against the Project infrastructure to better quantify the crossing of streams for each Project component. The number of streams with which each Project component interacts is summarized in **Table 3.4-1,** based on the Applicant's field surveys (Horse Heaven Wind Farm, LLC 2021).

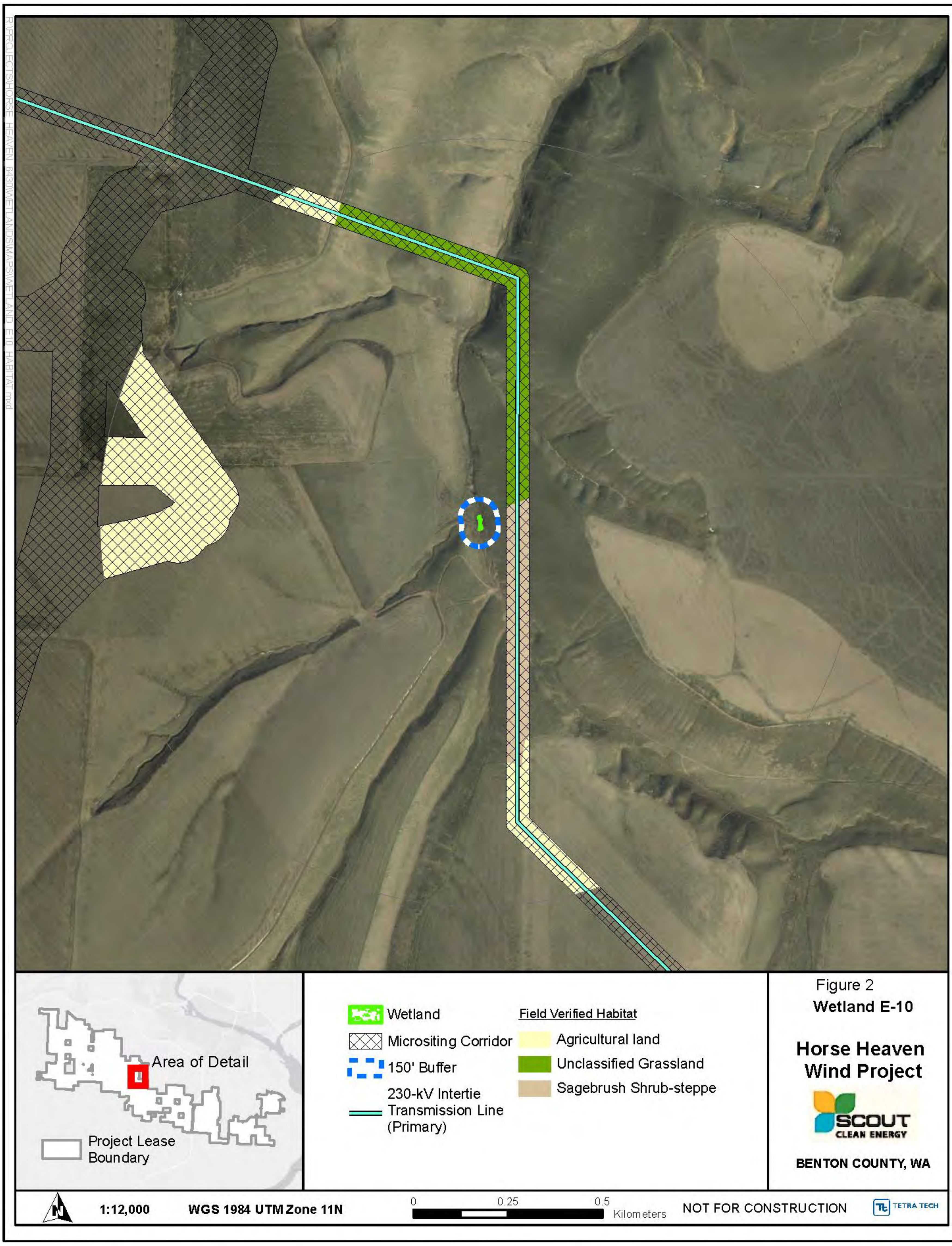
Ephemeral and intermittent streams are important components of the broader watershed. While no streams within the Lease Boundary are fish bearing, streams within the Lease Boundary drain into the Columbia and Yakima Rivers, which provide important migratory and rearing fish habitat. Streams within the Lease Boundary provide inputs of sediment, nutrients, and organic matter to downstream environments and are hydraulically connected to the larger Yakima and Columbia Rivers (EPA 2008). The Columbia River contains fish, including species listed under the Endangered Species Act (ESA). The Columbia River provides critical habitat for salmonids, including ESA-listed Chinook salmon (*Oncorhynchus tshawytscha*), sockeye salmon (*O. nerka*), steelhead (*O. mykiss*), and bull trout (*Salvelinus confluentus*). The Yakima River provides habitat for ESA-listed steelhead and bull trout (Horse Heaven Wind Farm, LLC 2021).

Table 3.4-1: Interaction of Streams with the Proposed Project

Project Infrastructure	Location	Interactions with Ephemeral Streams	Interactions with Intermittent Streams
Wind Energy Micrositing Corridor	Turbine Option 1	31	2
	Turbine Option 2	31	2
Solar Siting Areas	East Solar Field	5	0
	County Well Solar Field	0	0
	Sellards Solar Field	2	0
BESS	BESS adjacent to the Bofer Canyon – HH-East Substation	0	0
	BESS adjacent to the Primary HH-West Step-up Substation	0	0
	BESS adjacent to the Alternate HH-West Step-Up Substation	0	0
Substations	HH-East Substation	0	0
	Primary HH-West Intermediate Substation	0	0
	Alternate HH-West Intermediate Substation	0	0
	Primary HH-West Step-Up Substation	0	0
	Alternate HH-West Step-Up Substation	0	0

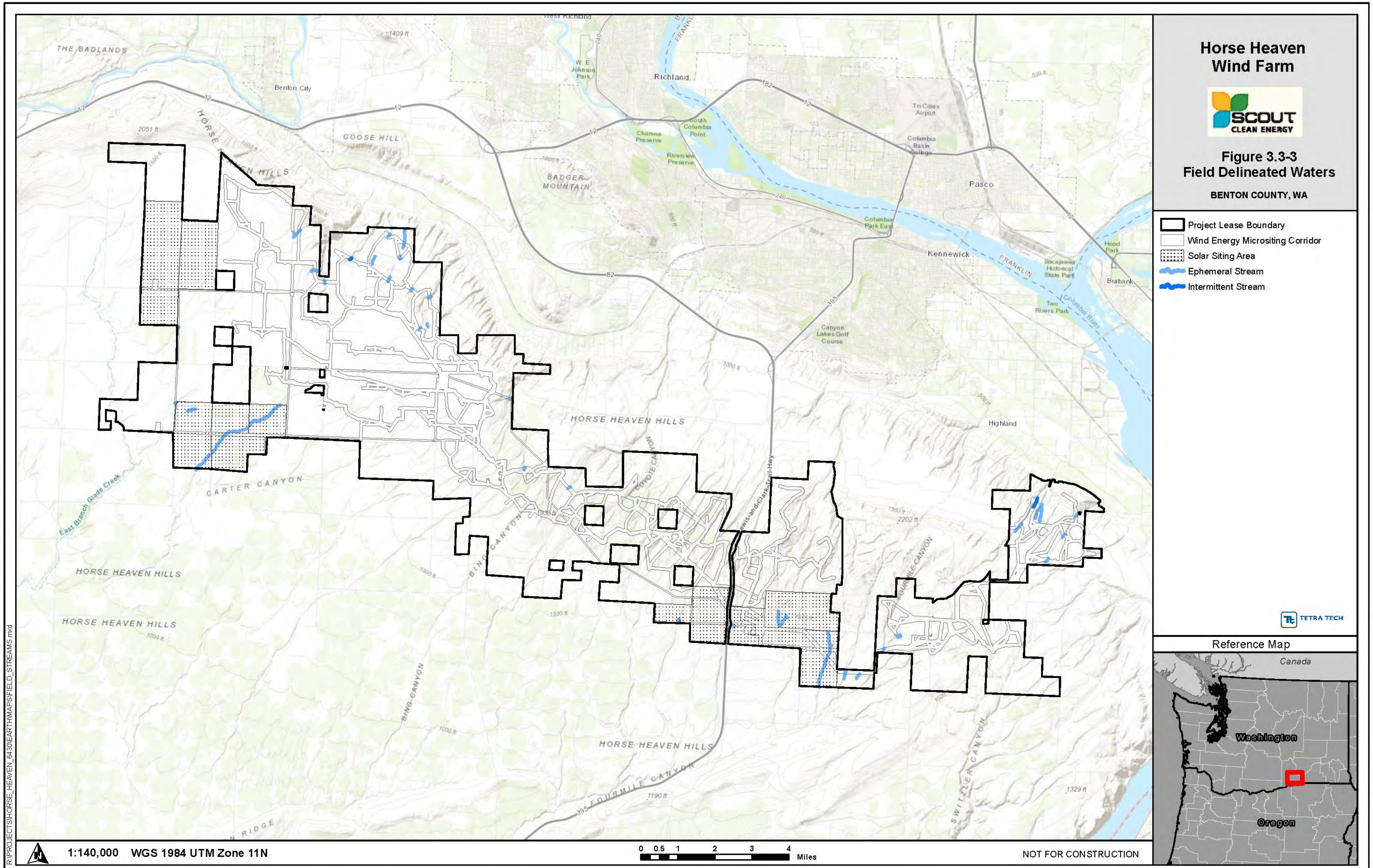
BESS = battery energy storage system

This Page Intentionally Left Blank



Source: Tetra Tech 2021

Figure 3.4-2: Wetland Delineated in the Lease Boundary during May 2020 Field Surveys by the Applicant



Source: Horse Heaven Wind Farm, LLC 2021

Figure 3.4-3: Waters Delineated in the Lease Boundary from Field Surveys

3.4.1.2 Runoff/Absorption

The Applicant provided the following information to characterize the existing runoff and absorption conditions within the Lease Boundary (Horse Heaven Wind Farm, LLC 2021).

- Surface water is anticipated to infiltrate to the ground, based on the moderate permeability and depth of soils in the Lease Boundary.
- Ultimately, surface water drains to the Yakima River, located north of the Lease Boundary, and the Columbia River, located north, east, and south of the Lease Boundary.
- Construction of the Project is anticipated to increase the total area of impervious surfaces in the Lease Boundary from the gravel access roads; however, the increase is not expected to notably affect the runoff. Assuming that the developed/disturbed habitat category from the Applicant's habitat mapping is all impervious surfaces, there are approximately 836 acres of impervious surface in the Project Lease Boundary (1.2 percent) at present (Horse Heaven Wind Farm, LLC 2021).

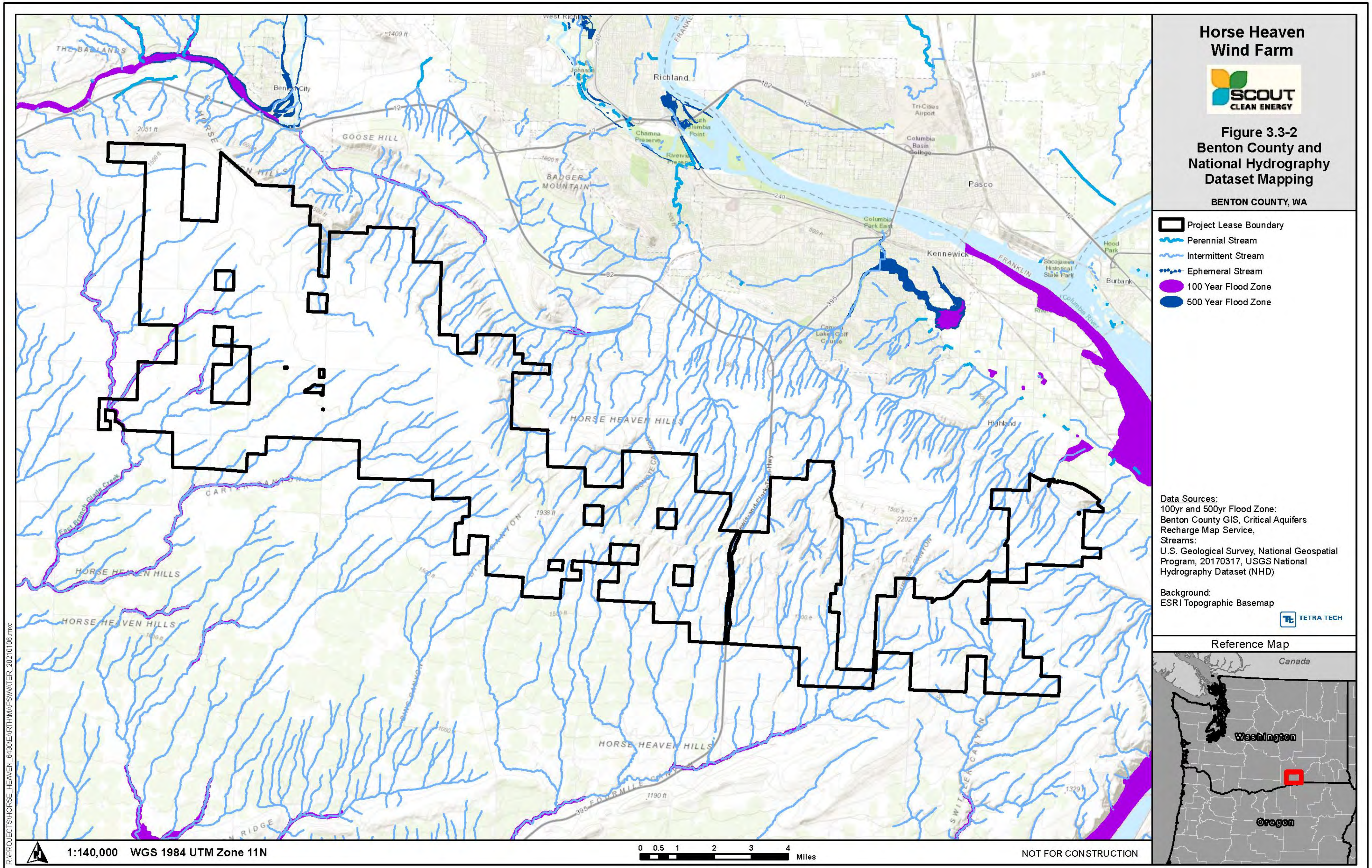
3.4.1.3 Floodplains

The Applicant provided the following information to characterize the floodplains within the Lease Boundary (Horse Heaven Wind Farm, LLC 2021).

- Approximately 149 acres of 100-year floodplains, also referred to as Frequently Flooded Areas in the Benton County Code, occur within the Lease Boundary. These areas are visible in **Figure 3.4-4** in the western section of the Lease Boundary and are associated with Critical Aquifer Recharge Areas (CARAs) as defined by Benton County Code Chapter 15.06 (Benton County 2018). CARAs are areas that act to recharge aquifers, which are used for potable water, as defined by Washington Administrative Code 365-190-100 (Washington State 2022).
- Approximately 160 acres of alluvial soils that are associated with CARAs also occur within the Lease Boundary. Alluvial soils are characterized by deposition by running water such as within a stream bed.
- No data on five-year and 50-year floodplains are available within the Lease Boundary.

Based on the present layout, approximately 0.8 acres of 100-year floodplain occur within areas identified as requiring temporary disturbance located within the Micrositing Corridor.

This Page Intentionally Left Blank



Source: Horse Heaven Wind Farm, LLC 2021

Figure 3.4-4: 100-Year and 500-Year Floodplain in the Project Lease Boundary Vicinity

3.4.1.4 Groundwater

The Applicant provided the following information to characterize the existing groundwater regime within the Lease Boundary (Horse Heaven Wind Farm, LLC 2021).

- Data available from the U.S. Geological Survey Washington Current Water Conditions identify the depth to groundwater as below normal, corresponding to approximately 184 feet below ground surface over most of the Lease Boundary. Data regarding groundwater movement, quality, and quantity within or near the Lease Boundary were not provided in the ASC for the Project (Horse Heaven Wind Farm, LLC 2021).
- Water well depths within the Lease Boundary range from approximately 55 to 1,506 feet below ground surface and are drilled primarily into the Columbia Plateau basaltic-rock aquifers. These water wells are used for domestic, stock, and irrigation (Horse Heaven Wind Farm, LLC 2021).
- As described in Section 3.4.1.3, there are approximately 160 acres of alluvial soils (i.e., soils deposited by surface water) associated with CARAs within the Lease Boundary (Benton County Code 15.06; Benton County 2018). CARAs are areas identified as important for critical recharge of aquifers (Benton County 2018).
- As described in Section 3.2, boreholes were evaluated for the presence and level of any groundwater during and shortly after drilling operations associated with the Applicant’s geotechnical investigations. The boreholes did not display a static groundwater level (Horse Heaven Wind Farm, LLC 2021). Groundwater is not anticipated to impact Project design or construction. During the detailed geotechnical investigation, piezometers may be installed for more accurate site groundwater levels (Appendix B, Horse Heaven Wind Farm, LLC 2021).

3.4.1.5 Public Water Supply

The Applicant provided the following information to characterize public water supply sources (Horse Heaven Wind Farm, LLC 2021).[3]

- No public water supply wells are located within the Lease Boundary.
- The proposed water supply for construction is the City of Kennewick. Public water supply sources are the Columbia River and two groundwater collector wells on the banks of the Columbia River. An estimated 120 million gallons of water would be required for all construction activities.
- Water would be required during operations to wash solar modules in the Solar Siting Areas. Solar modules would be washed once per year during operations and would require an estimated 2,025,000 gallons of water annually. No additives would be used to wash solar panels. In addition, an estimated 5,000 gallons of water a day would be required for consumption and domestic use for kitchen and washroom facilities at the operation and maintenance buildings.
- A contractor such as Wing Air would be used to supply water during operations. If Wing Air is selected as the contractor, they have indicated that they propose to obtain water from the City of Kennewick for annual washing of the solar modules and consumption and domestic use at the operation and maintenance facilities during operations.

[3] Characteristics of public water supply for the study area are further discussed in Section 3.15.1, Public Services and Utilities.

This Page Intentionally Left Blank

3.5 Vegetation

This section describes the vegetation and supporting habitat in the proposed Horse Heaven Wind Farm (Project, or Proposed Action) vicinity. Section 4.5 presents an analysis of Project potential impacts on vegetation. The vegetation analyzed in this section is restricted to upland vegetation. Wetlands are covered under Section 3.4.

Regulatory Setting

The applicable federal, state, and county laws and regulations relevant to vegetation resources are provided in Section 4.5.

Methodology

The affected environment described in this section has been categorized into four spatial boundaries to assess vegetation. These areas were independently calculated from spatial data provided by Horse Heaven Wind Farm, LLC (Applicant) (Horse Heaven Wind Farm, LLC 2021b). To enable an assessment of each Project component independent of the others, the spatial data were used as the Application for Site Certification (ASC) did not provide data summaries to a sufficient degree of detail. The calculated numbers do not match what was provided in the ASC, due to overlapping areas that occur both within the Wind Energy Micrositing Corridor and the Solar Siting Areas. The four areas used in this analysis are:

- The Lease Boundary, which encompasses approximately 72,428 acres on Horse Heaven Hills.
- The Wind Energy Micrositing Corridor, which encompasses approximately 11,845 acres of predominantly linear features, including the turbines, support infrastructure (i.e., roads, crane paths, laydown yards, operations and maintenance facilities, meteorological towers), collector lines (overhead and underground), transmission lines (230 kilovolt [kV] and 500 kV), the Primary HH-West Intermediate Substation, the Alternate HH-West Intermediate Substation, the Primary HH-West Step-up Substation, and the battery energy storage system (BESS) adjacent to the Alternate HH-West Step-up Substation. The Micrositing Corridor is located mostly within the Lease Boundary, except for three locations where infrastructure crosses Interstate 82.
- Solar Siting Areas, which encompass approximately 10,755 acres. Where information provided by the Applicant allows, the Solar Siting Areas are further divided into the following areas:
  - East Solar Field, which encompasses approximately 4,389 acres, including the HH-East Substation and the BESS adjacent to the Bofer Canyon – HH-East Substation
  - County Well Solar Field, which encompasses approximately 3,343 acres, including the Alternate HH-West Step-up Substation and the BESS adjacent to the Alternate HH-West Step-up Substation
  - Sellards Solar Field, which encompasses approximately 3,023 acres[4]
- The Vegetation Area of Analysis (VAA), which encompasses approximately 202,289 acres and includes the Lease Boundary plus an additional 2-mile buffer.

The VAA is the same area used for analysis of wildlife and habitat in Section 3.6. A 2-mile buffer was selected because this was the distance used for aerial raptor surveys by the Applicant during stick nest surveys (Appendix K, Horse Heaven Wind Farm, LLC 2021a), and vegetation is closely associated with wildlife and

[4] Unlike the East Solar Field and County Well Solar Field, the substation is located outside what is shown as the Solar Siting Area for the Sellards Solar Field.

wildlife use. Where data are available from the Applicant, analyses are provided for each Project component (i.e., Wind Energy Micrositing Corridor, Solar Siting Areas, substations, and BESS[s]). Where data by Project component are unavailable from the Applicant, analyses are summarized for all Project components.

Field studies were not conducted for this Draft Environmental Impact Statement (EIS); rather, this analysis relies on information provided in the ASC and the 2021 Botany and Habitat Survey Report for Horse Heaven Wind Farm (Horse Heaven Wind Farm, LLC 2021a; Tetra Tech 2021) and from government and publicly available sources. Habitat summaries provided in Section 3.5.2 for the Lease Boundary, Micrositing Corridor, and Solar Siting Areas were calculated independently, using the spatial data provided by the Applicant (Horse Heaven Wind Farm, LLC 2021b).

3.5.1 Affected Environment

The VAA is in the Columbia Plateau Ecoregion, which is an arid environment dominated by grassland-steppe and shrub-steppe (Clarke and Bryce 1997). The dominant vegetation association in the VAA was historically big sagebrush (*Artemisia tridentata*) and bluebunch wheatgrass (*Pseudoroegneria spicata*) (Franklin and Dyrness 1988). However, much of the land and associated vegetation has been altered by anthropogenic activities, predominantly agriculture and grazing in the Horse Heaven Hills area.

The VAA is located in Benton County, in eastern Washington. Benton County falls within the rain shadow of the Cascade Mountains, which creates dry conditions year-round. Elevation within the Lease Boundary ranges from 604 to 2,051 feet above mean sea level (Horse Heaven Wind Farm, LLC 2021a). The average annual precipitation for the nearest city, the city of Kennewick, is approximately 7.7 inches (U.S. Climate Data 2021). Average annual snowfall is approximately 1 inch (U.S. Climate Data 2021). Summers are hot and mostly clear, while winters are cold and partly cloudy (Horse Heaven Wind Farm, LLC 2021a). The annual average high temperature is approximately 66 degrees Fahrenheit (°F), with low average yearly temperatures of 44°F (U.S. Climate Data 2021).

3.5.2 Habitat

The following sections describe the existing habitat within the Lease Boundary and VAA.

3.5.2.1 Habitat Mapping in the Lease Boundary

Habitat mapping is available from the Applicant for the area within the Lease Boundary and was developed using both aerial imagery and field survey data. The Applicant adapted habitat types and subtypes to describe the existing environment from descriptions in the Washington Department of Fish and Wildlife's (WDFW) Wind Power Guidelines (WDFW 2009) and Johnson and O'Neil (2001), except the description for rabbitbrush shrubland and non-native grassland, which have been described by the Applicant in the ASC. The Applicant completed field surveys of the Wind Energy Micrositing Corridor and Solar Siting Areas in 2020 and 2021 to characterize the existing conditions. All parts of the Micrositing Corridor and Solar Siting Areas were field surveyed, except for 604 acres that were not accessible within two parcels of land in the Sellards Solar Field. Photos of representative habitat subtypes in the Lease Boundary are provided in Appendix 3.5-1. Descriptions of each habitat type and subtype occurring in the Lease Boundary are provided below (Horse Heaven Wind Farm, LLC 2021a).

- **Agricultural land (photo 1, Appendix 3.5-1)** is defined as areas used for agricultural purposes. Within the Lease Boundary, this is primarily active wheat fields and fallow wheat fields.

- **Developed/disturbed areas (photo 2, Appendix 3.5-1)** are areas of anthropogenic development such as roads, buildings, and structures associated with human development (e.g., radio towers), which are primarily unvegetated or dominated by weedy species.
- **Grasslands** are graminoid and forb-dominated ecosystems. Grassland subtypes in the Lease Boundary are described below based on the information provided in the ASC and the 2021 Botany and Habitat Survey Report for Horse Heaven Wind Farm (Horse Heaven Wind Farm, LLC 2021a; Tetra Tech 2021).
  - **Eastside (interior) grassland (photo 3, Appendix 3.5-1)** is dominated by native perennial grasses: bluebunch wheatgrass (*Pseudoroegneria spicata*), Sandberg's bluegrass (*Poa secunda*), and Great Basin wildrye (*Leymus cinereus*). The forb layer is diverse and includes species such as Carey's balsamroot (*Balsamorhiza careyana*), fiddleneck (*Amsinckia* sp.), and lupine (*Lupinus* sp.). The shrub layer is typically less than 5 percent of total vegetation cover with green rabbitbrush (*Chrysothamnus viscidiflorus*) and rubber rabbitbrush (*Ericameria nauseosa*). The areas identified by the Applicant as Eastside (interior) grassland are considered Eastside Steppe Priority Habitat in Washington State (WDFW 2008).
  - **Non-native grassland (photo 4, Appendix 3.5-1)** includes areas of formerly planted and native grassland that are now dominated by non-native grass and forb species and have transitioned into non-native grassland. Within the Lease Boundary, non-native grasslands are areas dominated by cereal rye (*Secale cereale*), cheatgrass (*Bromus tectorum*), prickly lettuce (*Lactuca serriola*), tall tumblemustard (*Sisymbrium altissimum*), and yellow salsify (*Tragopogon dubius*). Native plants may be present but represent a small percentage of the overall vegetation cover.
  - **Planted grasslands (photo 5, Appendix 3.5-1)** are lands that have been planted with non-native grasses, native grasses, and native shrubs. These lands may or may not be enrolled in the U.S. Department of Agriculture Conservation Reserve Program. Within the Lease Boundary, planted grasslands are typically characterized by perennial crested wheatgrass (*Agropyron cristatum*), bluebunch wheatgrass, big bluegrass (*Poa secunda* ssp. *juncifolia*), rabbitbrush, and low forb diversity.
  - **Unclassified grasslands** are areas identified as herbaceous (forb or graminoid) land cover, as classified by the National Land Cover Database (NLCD), that were not further classified into one of the above grassland subtypes. This classification is used for the portion of the Lease Boundary that lies outside the Wind Energy Micrositing Corridor and Solar Siting Areas, where field data are limited.
- **Shrublands** are ecosystems that have a conspicuous shrub layer. Shrubland subtypes within the Lease Boundary are described below.
  - **Dwarf shrub-steppe (photo 6, Appendix 3.5-1)** is a shrubland habitat located on lithosol soil. Dwarf shrub-steppe is dominated by the native dwarf shrub rock buckwheat (*Eriogonum sphaerocephalum*) and the native perennial grasses bluebunch wheatgrass and Sandberg's bluegrass. Non-native plants such as cheatgrass and cereal rye may be present. Dwarf shrub-steppe is part of the Shrub-steppe Priority Habitat in Washington State (WDFW 2008).
  - **Rabbitbrush shrubland (photo 7, Appendix 3.5-1)** is characterized by areas dominated by rubber rabbitbrush, which readily colonizes post-fire or post-agricultural development. Within the Lease Boundary, rabbitbrush shrubland occurs in former agriculture land areas that have been planted with native grasses, native shrubs, and/or non-native grasses. Rabbitbrush shrubland is dominated by

rabbitbrush, mainly green rabbitbrush and rubber rabbitbrush, with various native and non-native grasses and forbs. These areas may or may not be enrolled in the Conservation Reserve Program.

- **Sagebrush shrub-steppe (photo 8, Appendix 3.5-1)** is dominated by the native shrub big sagebrush (*Artemisia tridentata*), often with spineless horsebrush (*Tetradymia canescens*), rubber rabbitbrush, and green rabbitbrush. Sagebrush shrub-steppe ecosystems within the Lease Boundary typically have greater than 50 percent cover of sagebrush, but cover can range from 10 to 80 percent. Sagebrush shrub-steppe is part of the Shrub-steppe Priority Habitat in Washington State (WDFW 2008).
- **Unclassified shrubland** includes areas mapped as shrub or scrub by the NLCD and areas mapped as shrub-steppe during the 2018 surveys that could not be further differentiated into subtypes. This classification is only used for the area within the Lease Boundary outside the Wind Energy Micrositing Corridor and Solar Siting Areas, where field data are limited.

A summary of areas classified as each habitat type and subtype within the Lease Boundary and within areas of the proposed Project components is provided in **Table 3.5-1**. The location of habitat types identified by the Applicant is provided in **Figure 3.5-1**. The habitat types within each Solar Siting Area are further broken out in **Table 3.5-2**. For each habitat type, the percentage of habitat occurring in areas of the proposed Project components was compared to the total area available in the Lease Boundary (**Table 3.5-1**). All the Eastside (interior) grassland (Eastside Steppe), 89.7 percent of the dwarf shrub-steppe, and 17.9 percent of the sagebrush shrub-steppe habitats within the Lease Boundary occur in the areas of the proposed Project components.

Table 3.5-1: Habitat Types and Subtypes within the Lease Boundary and Project Component Areas[a]

Habitat Type/Subtype	Lease Boundary (acres)	Wind Energy Micrositing Corridor (acres)	Solar Siting Areas (acres)	Substation Areas (acres)	BESS Areas (acres)	Percentage of Habitat Type Available within Lease Boundary located within Project Component Areas
Agriculture land	53,450.1	9,219.3	8,409.0	36.6	18.1	33.0%
Developed/disturbed	835.7	206.5	128.8	0	0	40.1%
Grassland						
Eastside (interior) grassland (Eastside Steppe)[b]	173.5	56.8	153.3	0	0	100%
Non-native grassland	1,635.5	656.5	451.4	1.6	0	67.7%
Planted grassland	4,338.3	934.1	519.4	0	0	33.5%
Unclassified grassland[c]	6,125.2	0	0	0	0	0%
Shrubland						
Dwarf shrub-steppe[b]	23.2	20.8	0	0	0	89.7%
Rabbitbrush shrubland	3,037.7	560.3	1,024.9	0	0	52.2%
Sagebrush shrub-steppe[b]	1,372.0	190.1	67.9	0	0	18.8%
Unclassified shrubland[c]	1,436.6	0	<0.1	0	0	0%
Total	**72,427.9**	**11,844.5**	**10,754.7**	**38.2**	**18.1**	

Sources: WDFW 2008; Horse Heaven Wind Farm, LLC 2021c; Tetra Tech 2021

Notes:

(a) Calculations were completed using the spatial data provided by the Applicant (Horse Heaven Wind Farm, LLC 2021a). Areas of overlap may occur between Project components (e.g., the Wind Energy Micrositing Corridor may extend into the Solar Siting Area).

(b) Priority Habitats in the State of Washington (WDFW 2008).

(c) Unclassified grassland and unclassified shrubland habitat subtypes include the areas mapped during surveys conducted in 2018 or using National Land Cover Database data that were not further classified into subtypes (e.g., planted grassland, sagebrush shrub-steppe) during the 2020 and 2021 field surveys or 2020 desktop analysis.

BESS = battery energy storage facility

Table 3.5-2: Habitat Types and Subtypes in Each of the Solar Siting Areas[a]

Habitat Type	East Solar Field (acres)	County Well Solar Field (acres)	Sellards Solar Field (acres)
Agriculture land	2,471.6	3,223.7	2,713.6
Developed/disturbed	53.8	34.8	40.2
Grassland			
Eastside (Interior) Grassland (Eastside steppe)[b]	153.3	0	0
Non-native grassland	398.5	4.5	48.4
Planted grassland	236.1	79.9	203.3
Unclassified grassland[c]	0	0	0
Shrubland			
Dwarf shrub-steppe[b]	0	0	0
Rabbitbrush shrubland	1,024.9	0	0
Sagebrush shrub-steppe[b]	50.9	0	17.0
Unclassified shrubland[c]	<0.1	0	0
Total	**4,389.2**	**3,342.9**	**3,022.63**

Sources: WDFW 2008; Horse Heaven Wind Farm; LLC 2021b

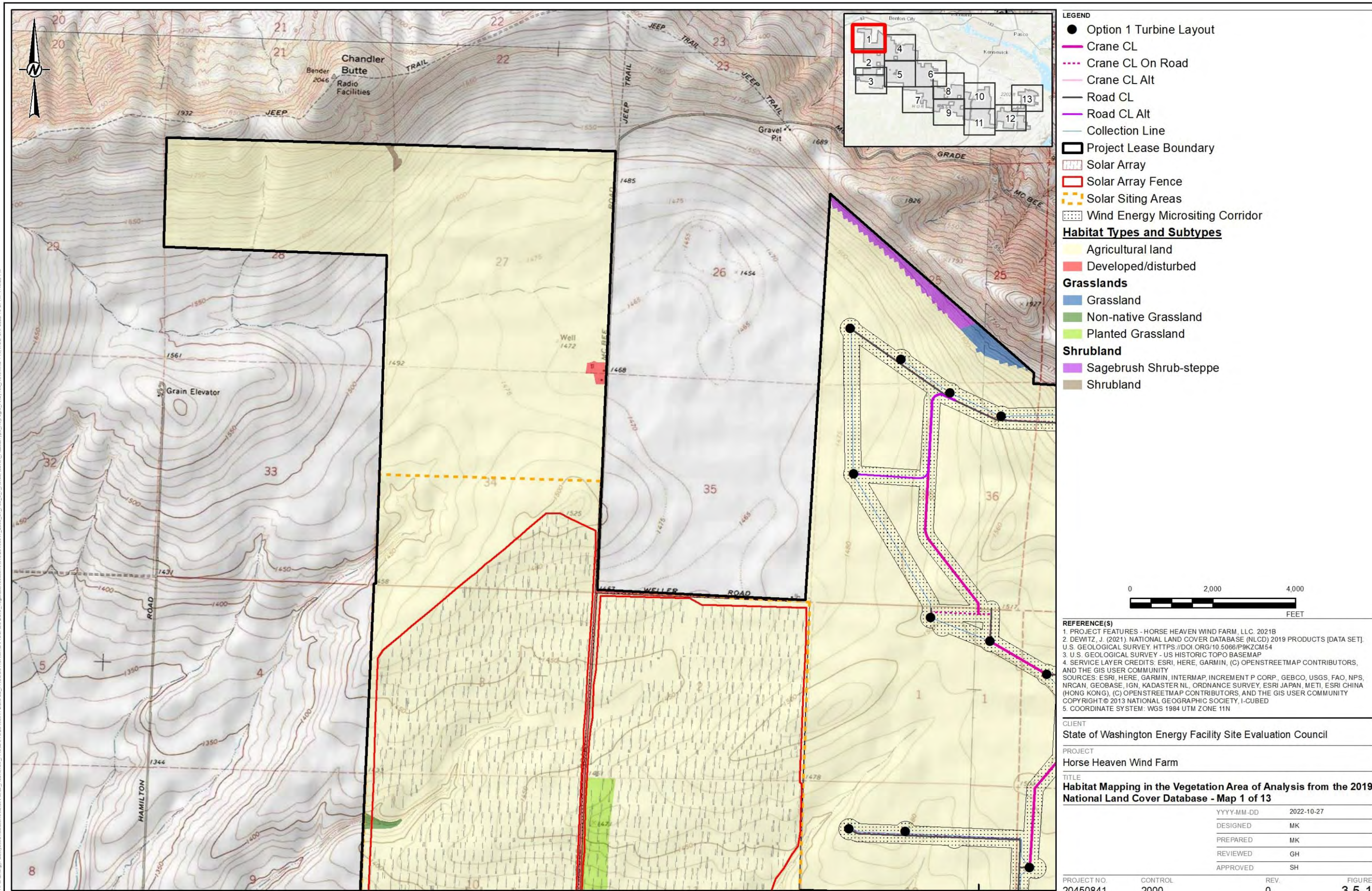
Notes:

(a) Calculations were completed using the spatial data provided by the Applicant (Horse Heaven Wind Farm, LLC 2021b). Areas of overlap may occur between Project components (e.g., the Wind Energy Micrositing Corridor may extend into the Solar Siting Area).

(c) Priority Habitats in the State of Washington (WDFW 2008).

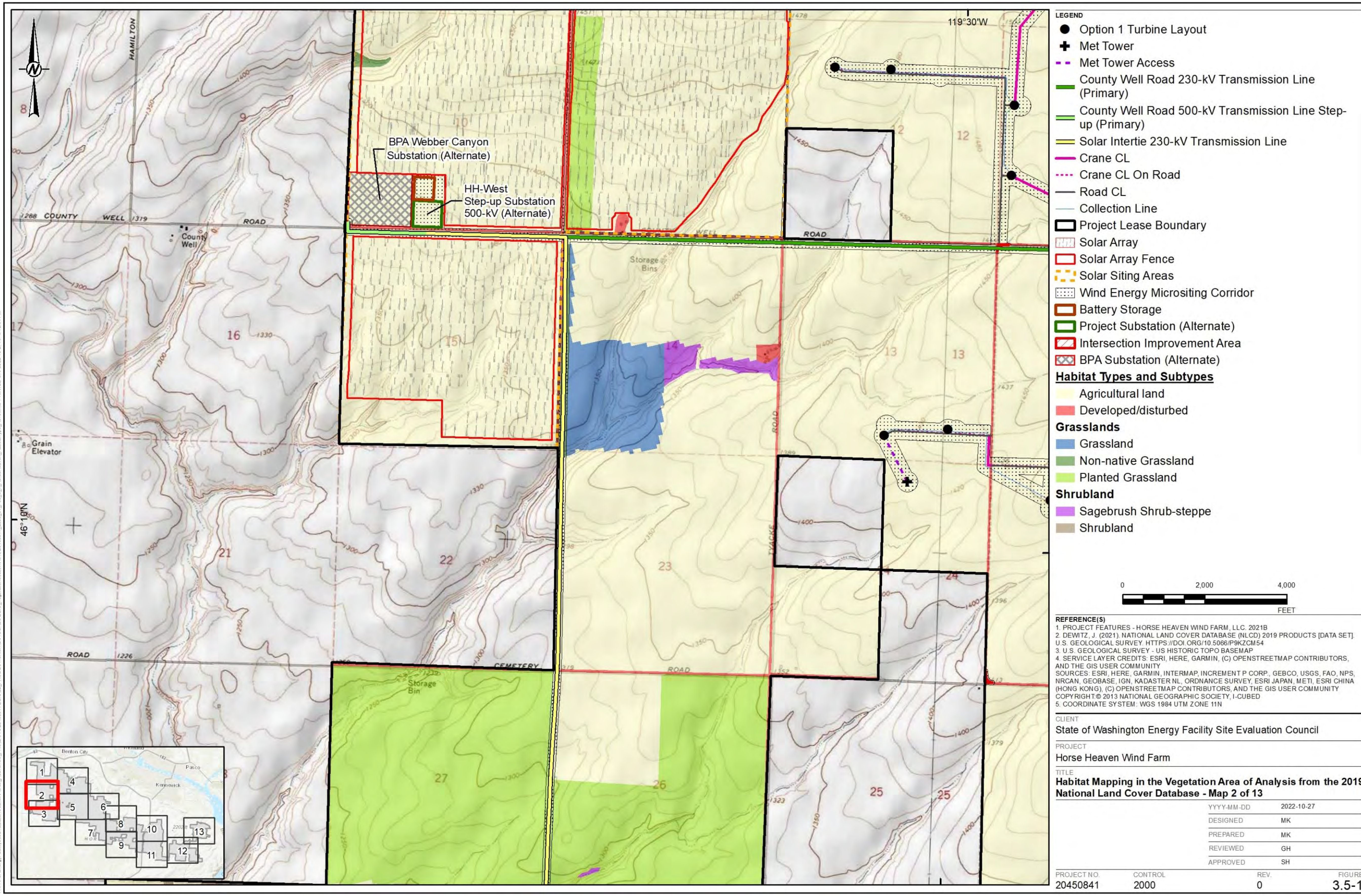
(b) Unclassified grassland and unclassified shrubland habitat subtypes include those areas mapped during surveys conducted in 2018 or using NLCD data that were not further classified into subtypes (e.g., planted grassland, sagebrush shrub-steppe) during the 2020 and 2021 field surveys or 2020 desktop analysis.

NLCD = National Land Cover Database



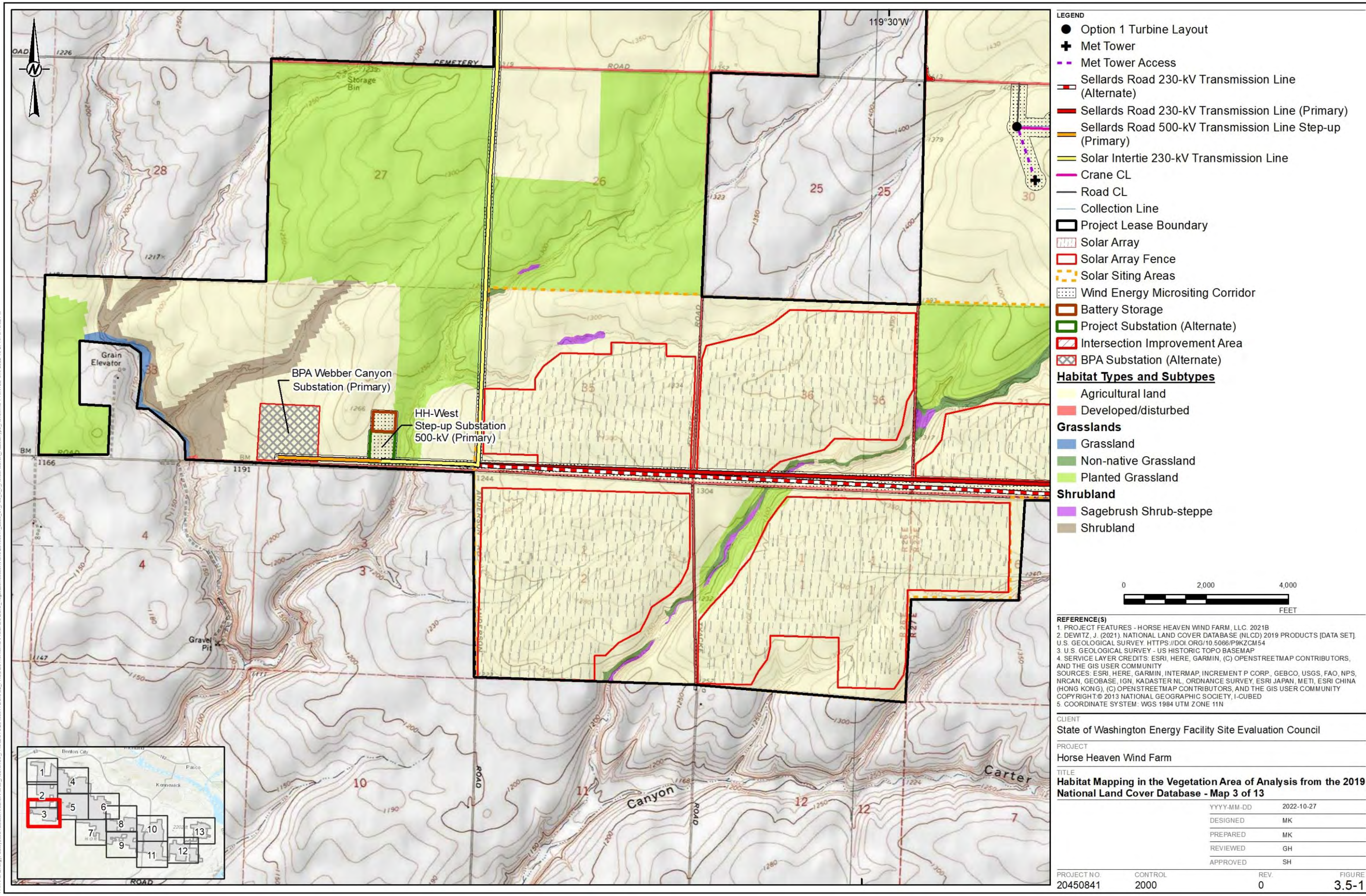
Sources: Horse Heaven Wind Farm, LLC 2021c; Tetra Tech 2021

Figure 3.5-1: Habitat Types and Subtypes within the Project Lease Boundary page 1 of 13



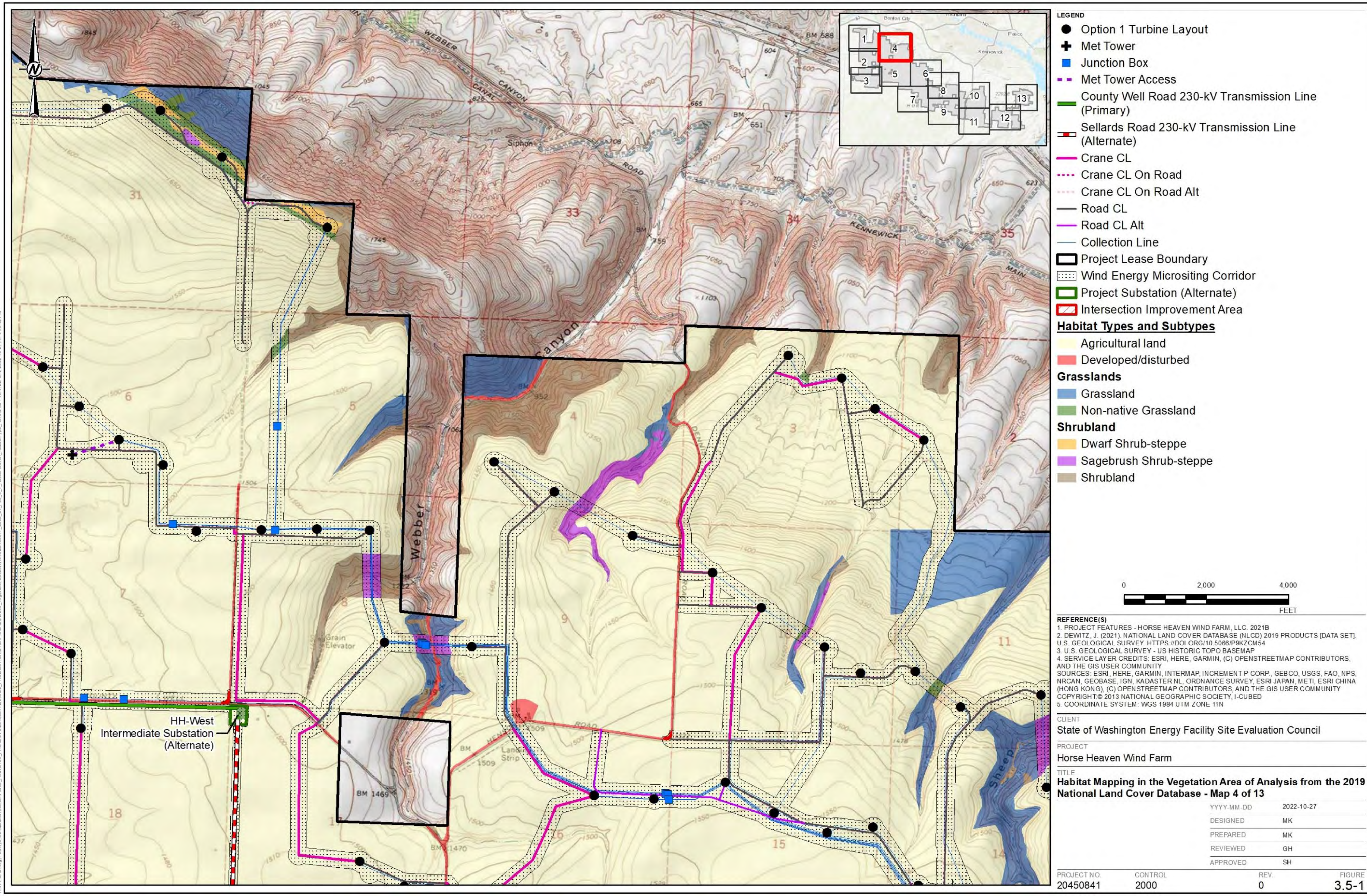
Sources: Horse Heaven Wind Farm, LLC 2021c; Tetra Tech 2021

Figure 3.5-1: Habitat Types and Subtypes within the Project Lease Boundary page 2 of 13



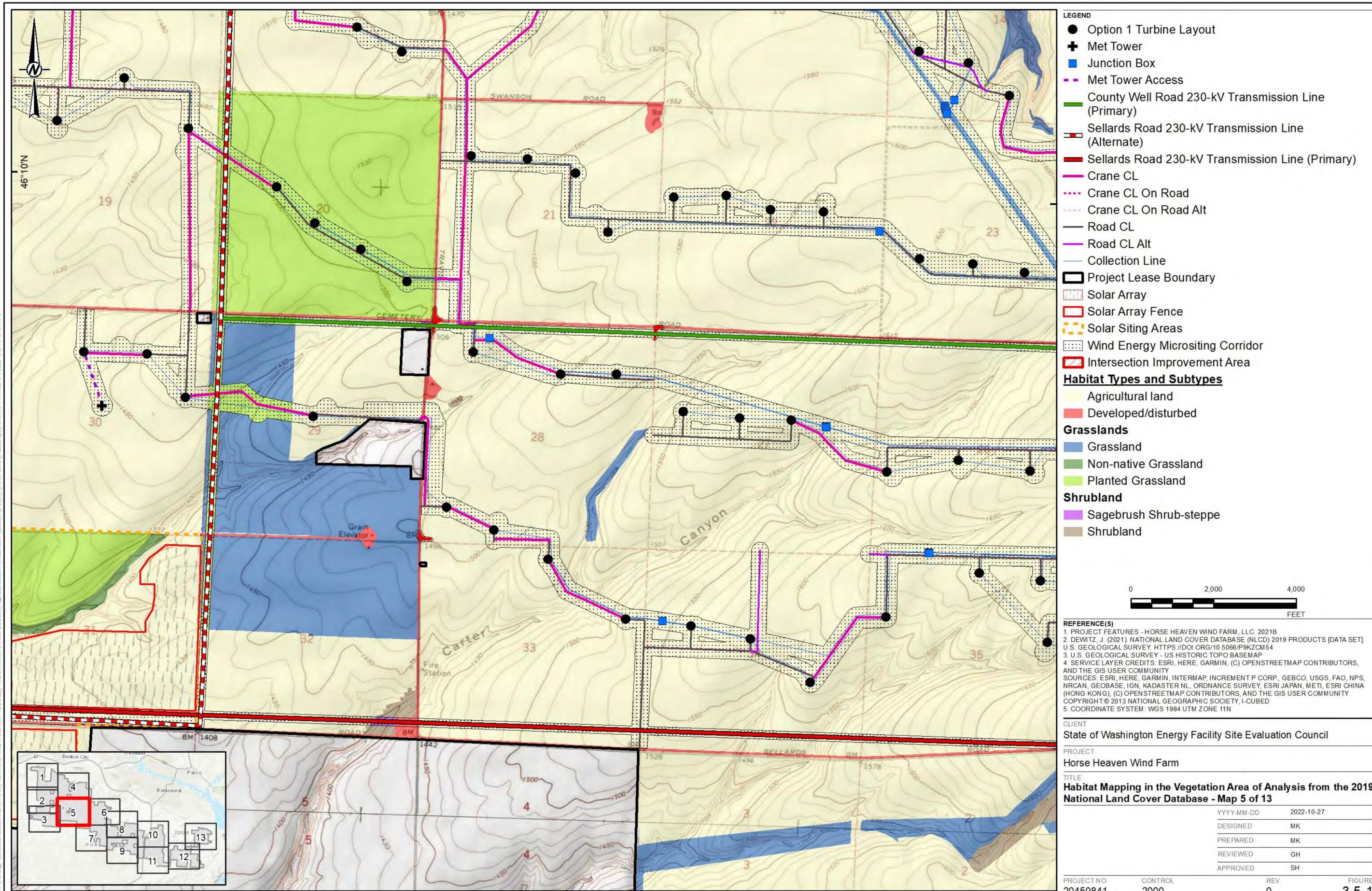
Sources: Horse Heaven Wind Farm, LLC 2021c; Tetra Tech 2021

Figure 3.5-1: Habitat Types and Subtypes within the Project Lease Boundary page 3 of 13



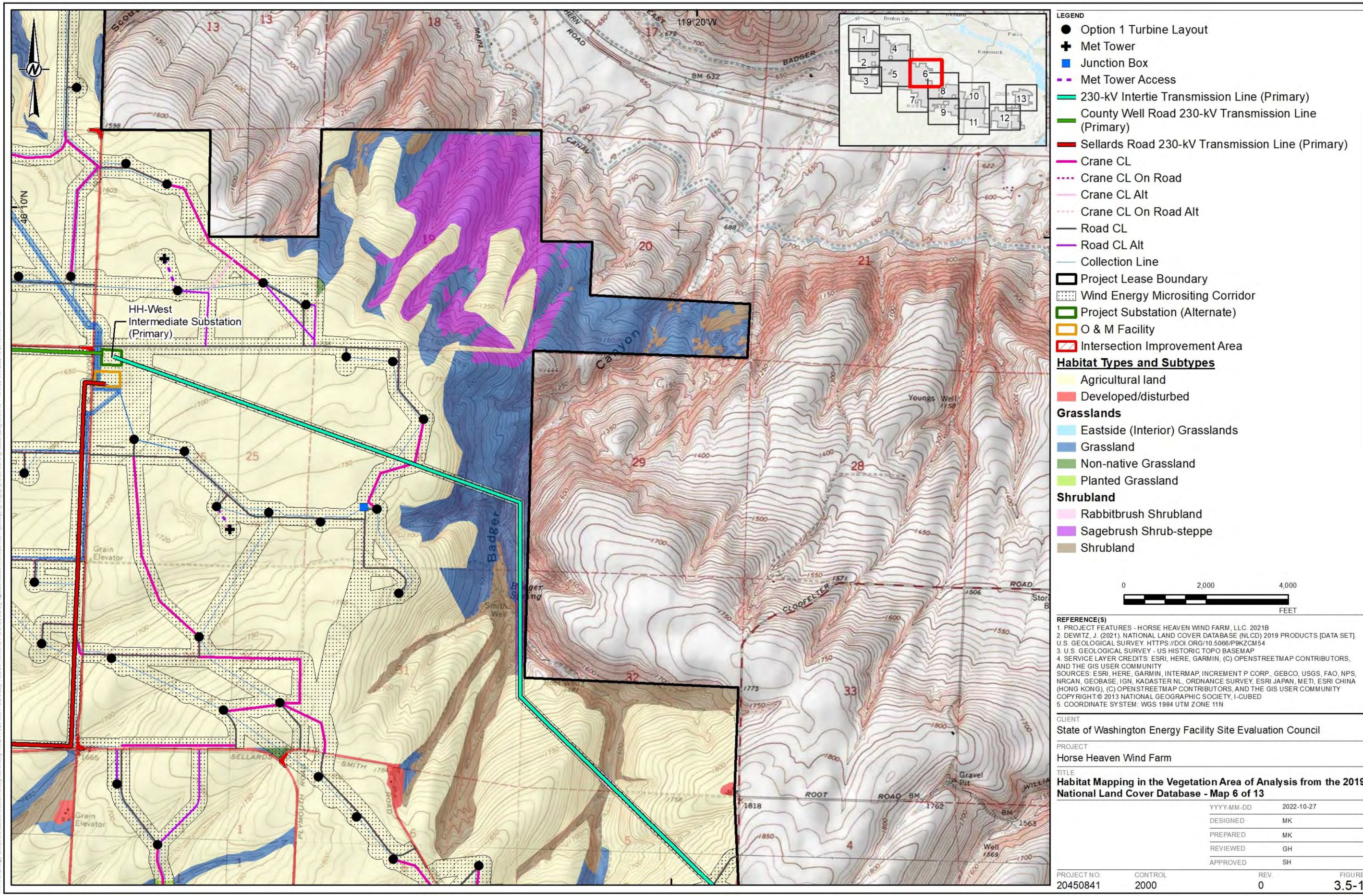
Sources: Horse Heaven Wind Farm, LLC 2021c; Tetra Tech 2021

Figure 3.5-1: Habitat Types and Subtypes within the Project Lease Boundary page 4 of 13



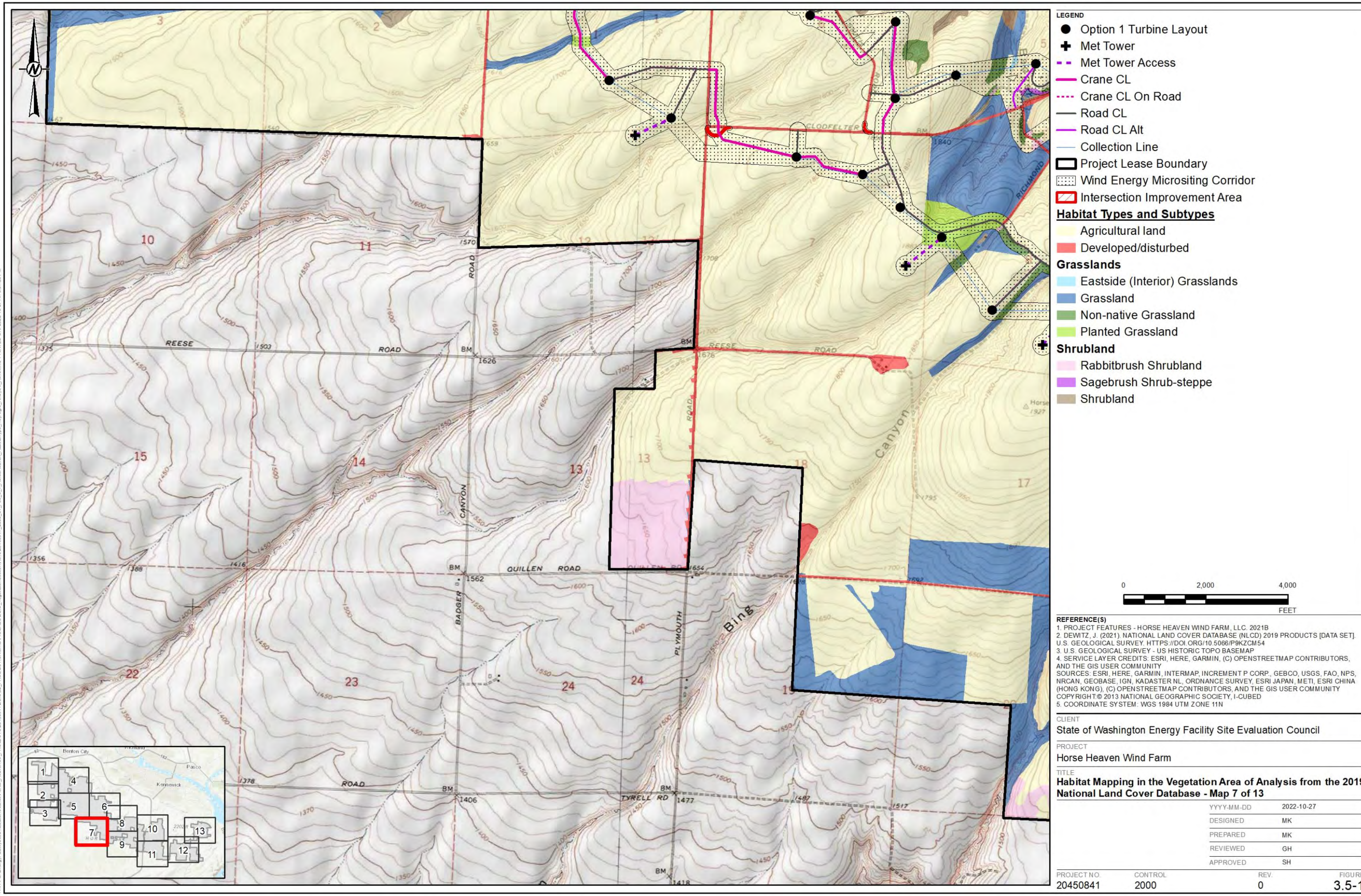
Sources: Horse Heaven Wind Farm, LLC 2021c; Tetra Tech 2021

Figure 3.5-1: Habitat Types and Subtypes within the Project Lease Boundary page 5 of 13



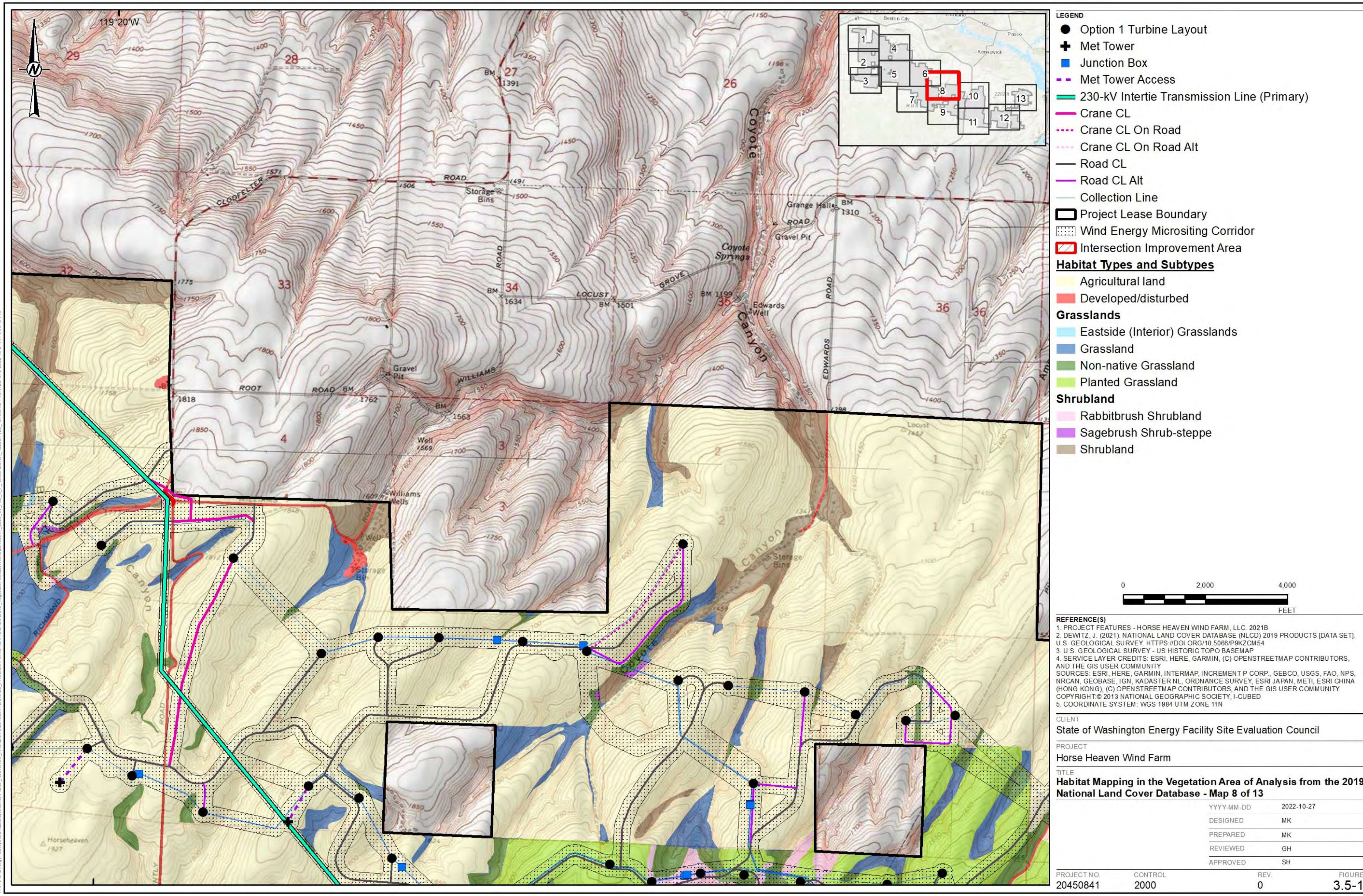
Sources: Horse Heaven Wind Farm, LLC 2021c; Tetra Tech 2021

Figure 3.5-1: Habitat Types and Subtypes within the Project Lease Boundary page 6 of 13



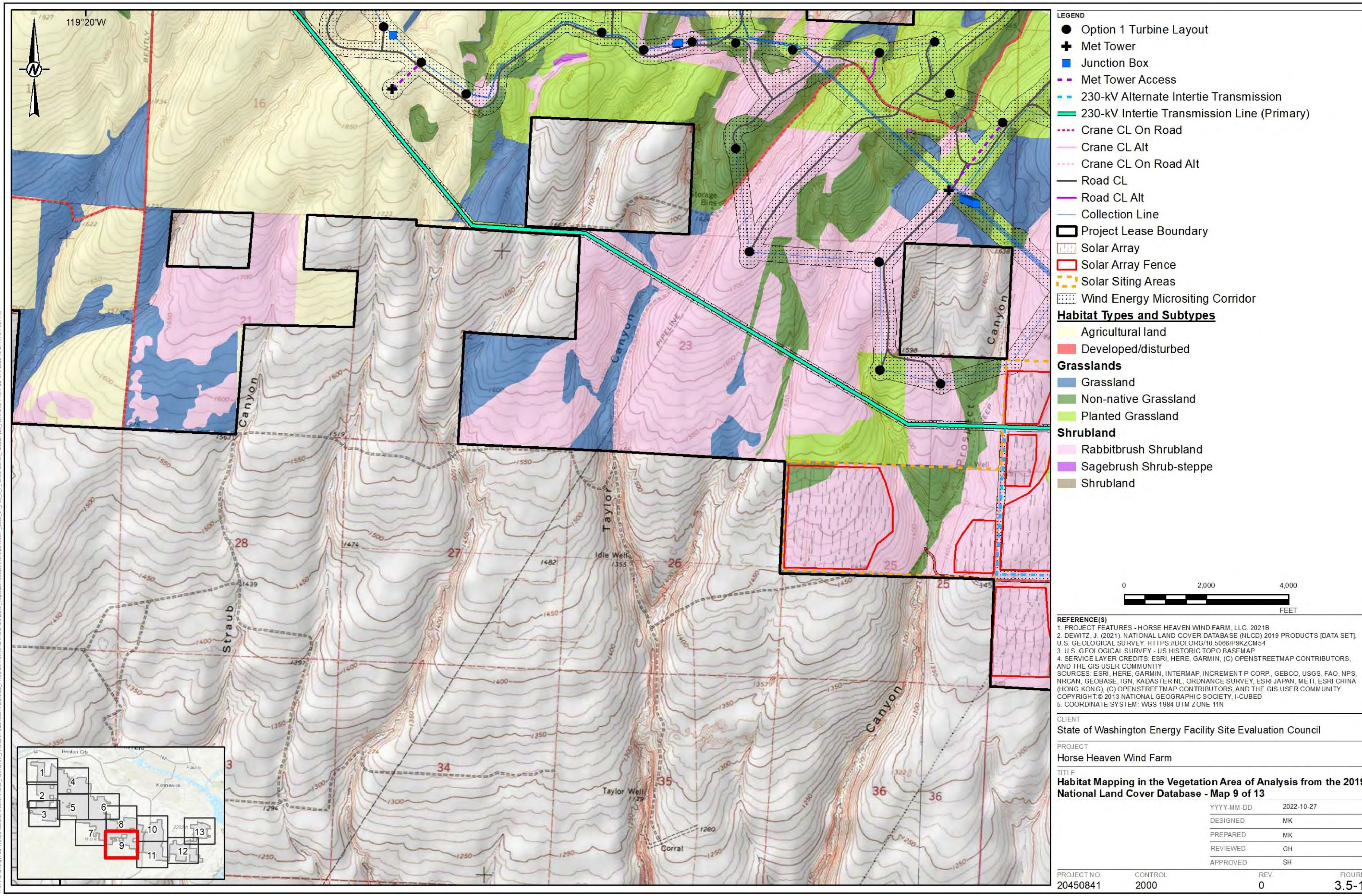
Sources: Horse Heaven Wind Farm, LLC 2021c; Tetra Tech 2021

Figure 3.5-1: Habitat Types and Subtypes within the Project Lease Boundary page 7 of 13



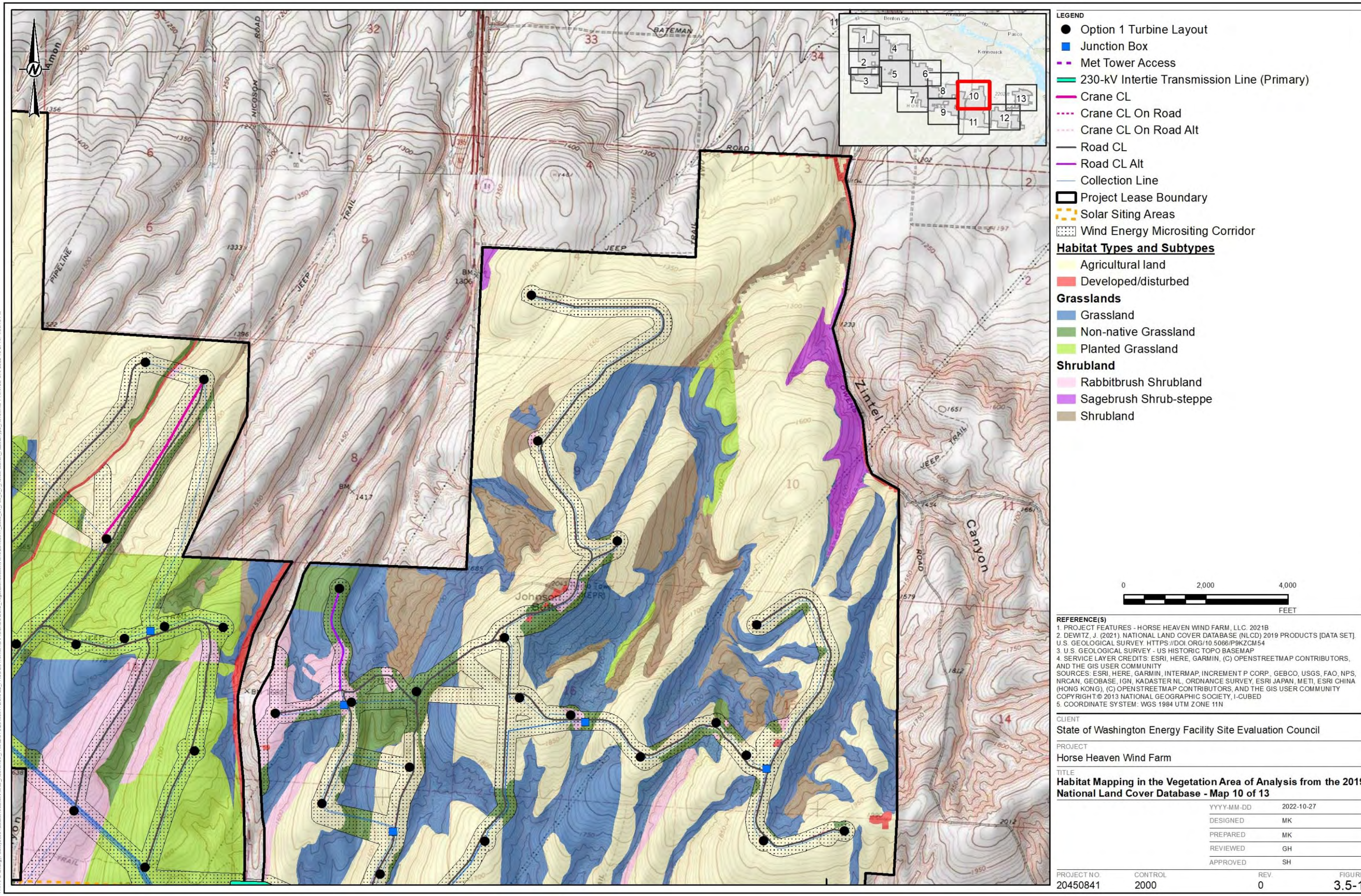
Sources: Horse Heaven Wind Farm, LLC 2021c; Tetra Tech 2021

Figure 3.5-1: Habitat Types and Subtypes within the Project Lease Boundary page 8 of 13



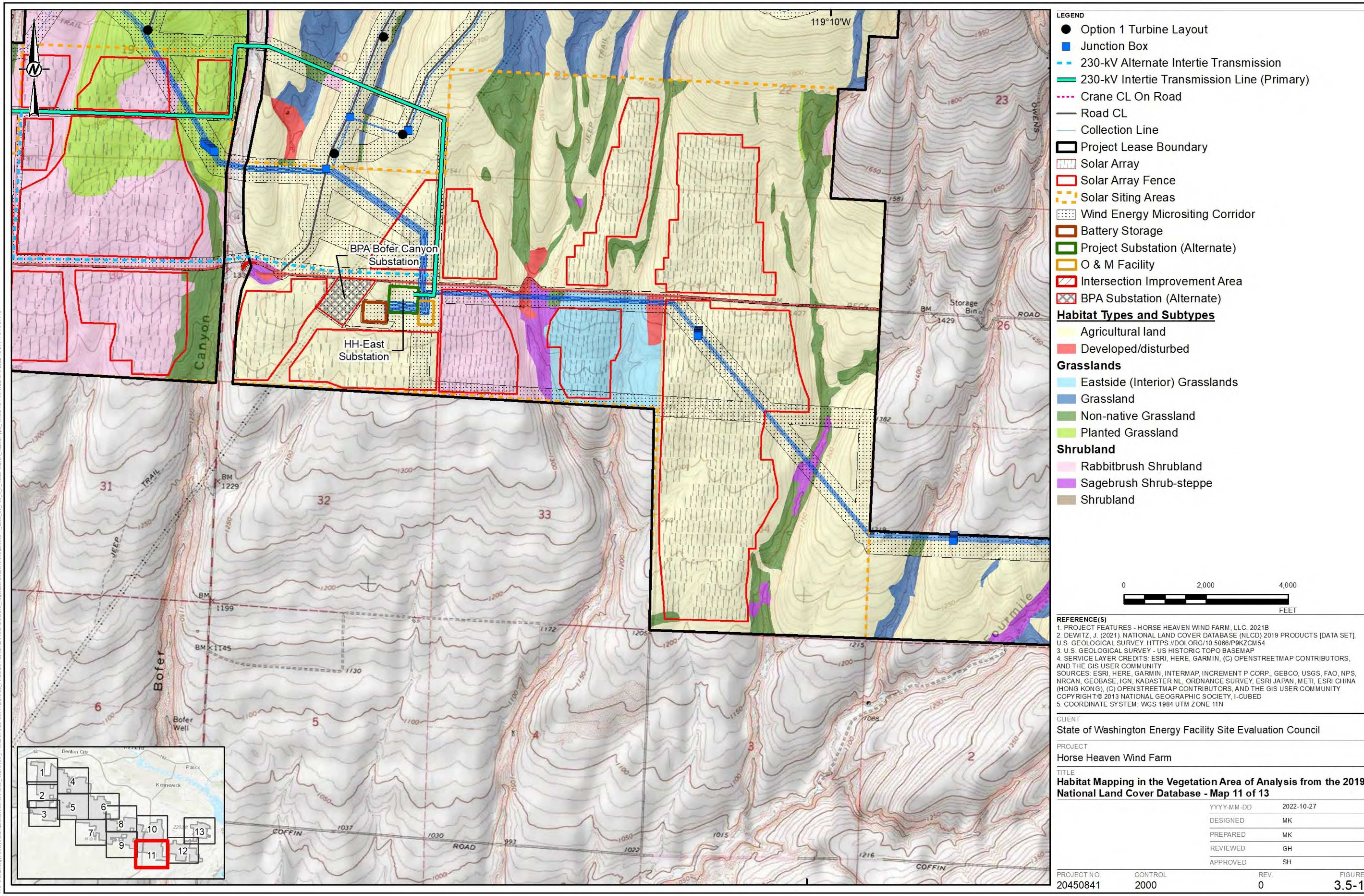
Sources: Horse Heaven Wind Farm, LLC 2021c; Tetra Tech 2021

Figure 3.5-1: Habitat Types and Subtypes within the Project Lease Boundary page 9 of 13



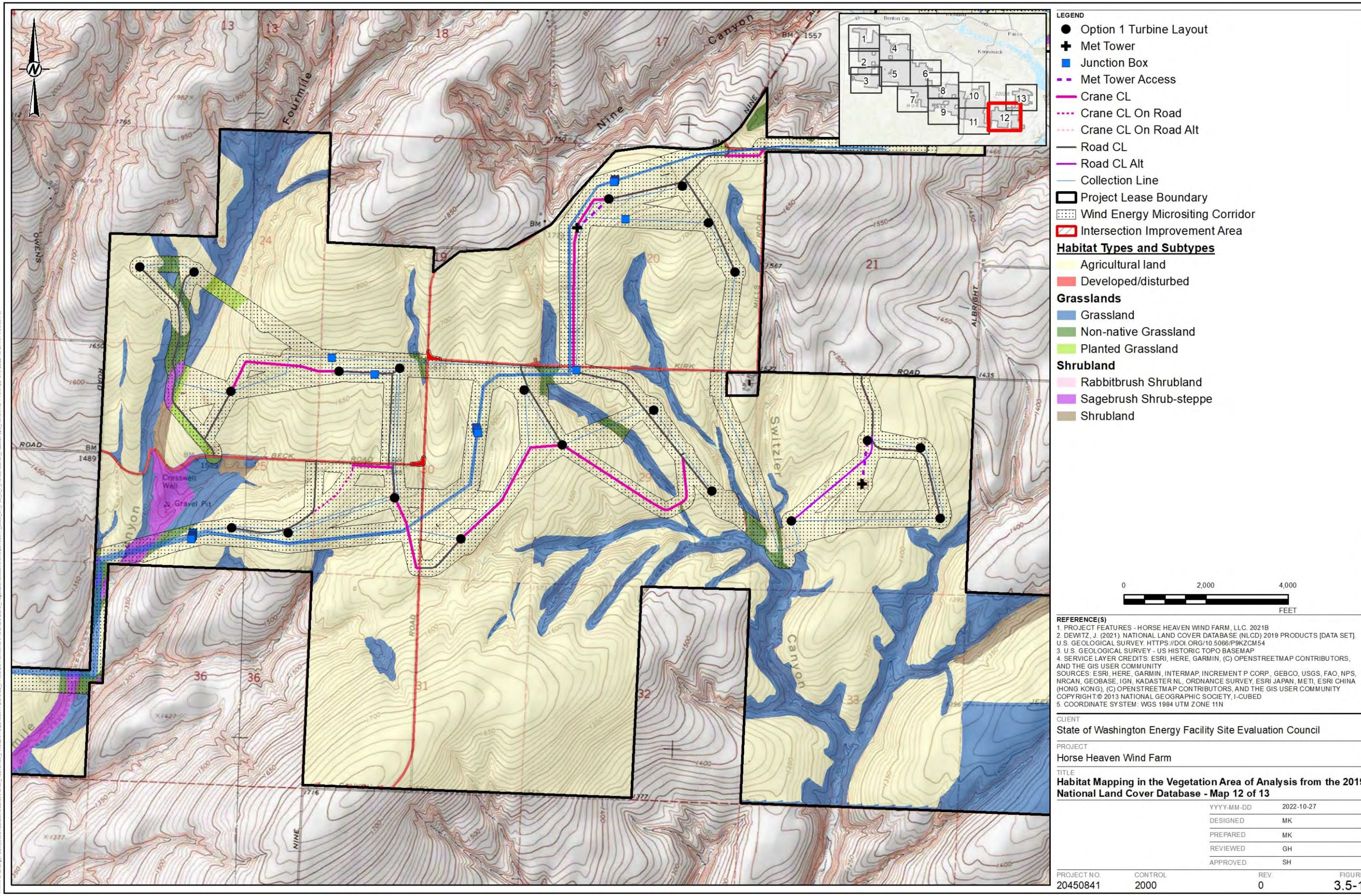
Sources: Horse Heaven Wind Farm, LLC 2021c; Tetra Tech 2021

Figure 3.5-1: Habitat Types and Subtypes within the Project Lease Boundary page 10 of 13



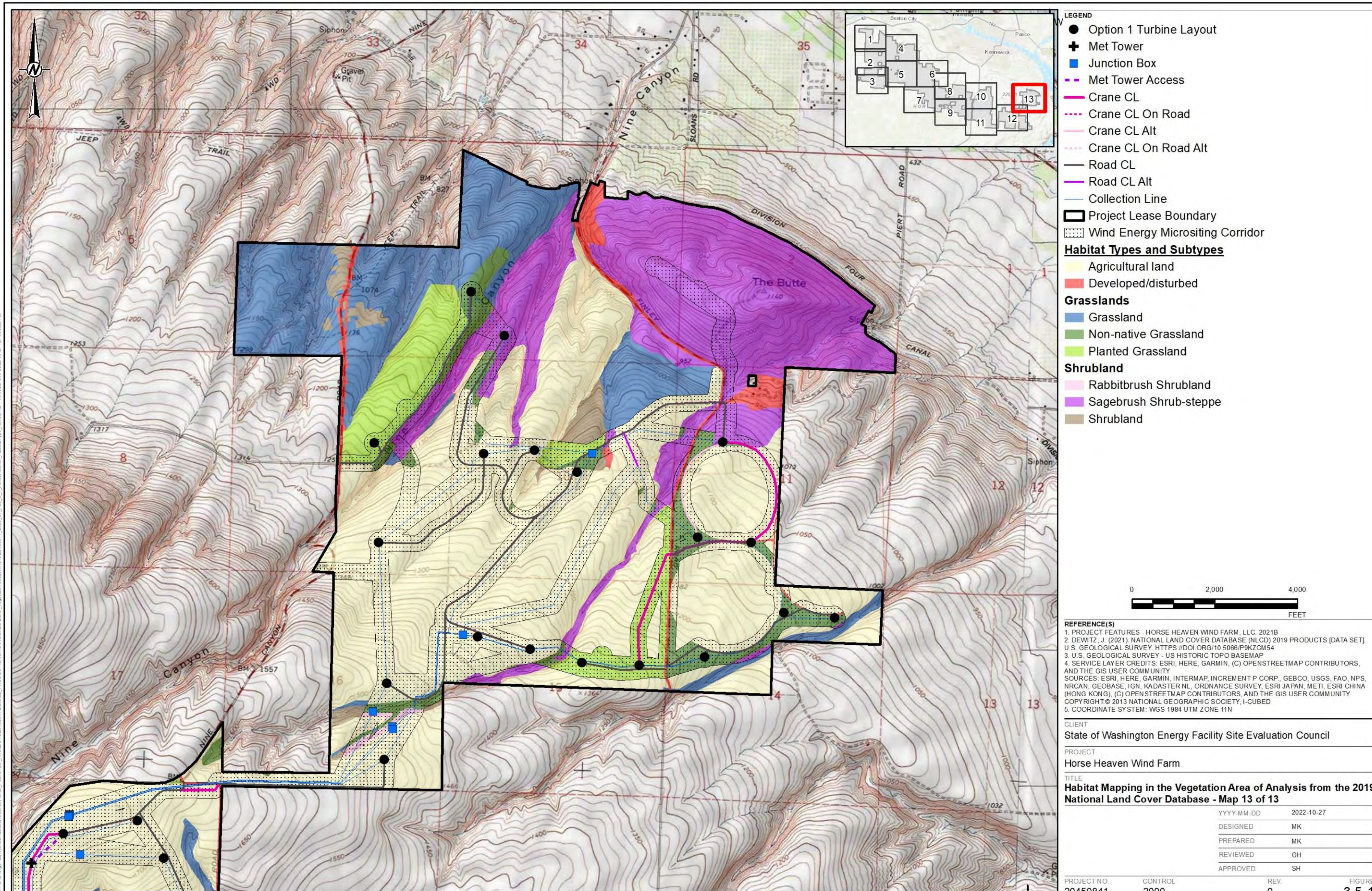
Sources: Horse Heaven Wind Farm, LLC 2021c; Tetra Tech 2021

Figure 3.5-1: Habitat Types and Subtypes within the Project Lease Boundary page 11 of 13



Sources: Horse Heaven Wind Farm, LLC 2021c; Tetra Tech 2021

Figure 3.5-1: Habitat Types and Subtypes within the Project Lease Boundary page 12 of 13



Sources: Horse Heaven Wind Farm, LLC 2021c; Tetra Tech 2021

Figure 3.5-1: Habitat Types and Subtypes within the Project Lease Boundary page 13 of 13

3.5.2.2 Habitat Mapping in the Vegetation Area of Analysis

Habitat mapping within the larger VAA, outside the Lease Boundary, was not available from the Applicant. To describe habitat within the VAA, data on habitat types were obtained from 2019 NLCD data (MRLC n.d.). This represents the best available data for the VAA. The data available from MRLC (n.d.) are low resolution, leading to inaccurate estimates in the total acreage. The data were summarized using a proportional value rather than the total acreage and provided as a percentage of the overall area to adjust for the low resolution. A summary of habitat types within areas of the proposed disturbance, the Lease Boundary, and the greater VAA is provided in **Table 3.5-3**. The habitat mapping in the VAA is provided in **Figure 3.5-2**. While it is understood that these data may overestimate or underestimate the amount of certain habitat types, they are nevertheless useful for understanding habitat types available in the surrounding area and therefore potential impacts on these habitats.

Habitat types within the VAA are described below (MRLC n.d.).

- **Barren Land:** areas of bedrock, desert pavement, scarps, talus, etc., where vegetation accounts for less than 15 percent of total cover
- **Cultivated Crops:** areas used to produce annual crops, including agricultural fields, orchards, and vineyards
- **Deciduous Forest:** areas dominated by trees taller than 5 meters and containing greater than 20 percent total vegetation cover
- **Developed:** Developed is divided into four categories based on the estimated cover of impervious surfaces
  - **Developed, Open Space:** areas of mixed use but mostly vegetated with lawn grasses, with impervious surfaces accounting for less than 20 percent of total cover
  - **Developed, Low Intensity:** areas of mixed construction and vegetation, with impervious surfaces accounting for 20 to 40 percent of total cover
  - **Developed, Medium Intensity:** areas of mixed construction and vegetation, with impervious surfaces accounting for 50 to 70 percent of total cover
  - **Developed, High Intensity:** areas of mixed construction and vegetation, with impervious surfaces accounting for 80 to 100 percent of total cover
- **Emergent Herbaceous Wetlands:** areas of perennial herbaceous vegetation accounting for greater than 80 percent of vegetative cover, and with soil or substrate periodically saturated with or covered by water
- **Evergreen Forest:** areas dominated by coniferous trees (75 percent of vegetation cover), where trees are greater than 5 meters and vegetation cover is greater than 20 percent
- **Grasslands/Herbaceous:** areas dominated by graminoid or herbaceous vegetation, generally greater than 80 percent of total vegetation cover
- **Open Water**: areas of open water with less than 25 percent cover of vegetation or soil
- **Pasture/Hay**: areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed and hay crops, typically on a perennial cycle

- **Shrub/Scrub**: areas dominated by shrubs less than 5 meters tall, with shrub canopy typically greater than 20 percent of total vegetation; includes true shrubs, early successional stage trees, and trees stunted due to environmental factors

- **Woody Wetlands**: areas where forest or shrubland vegetation accounts for greater than 20 percent of vegetation cover, with soil or substrate, periodically saturated with or covered by water

A summary of information from the 2019 NLCD (MRLC n.d.) mapping is provided based on the data presented in **Table 3.5-3**.

Vegetation Area of Analysis

- The description of cultivated crops from the 2019 NLCD habitat description is comparable to the Applicant's category of agriculture land. The 2019 NLCD shrub/scrub habitat description is comparable to the Applicant's category of shrubland habitat, which includes the habitat subtypes dwarf shrub-steppe, sagebrush shrub-steppe, rabbitbrush shrubland, and unclassified shrubland. The 2019 NLCD grassland/herbaceous habitat description is comparable to the Applicant's category of grassland habitat, which includes Eastside (interior) grassland (Eastside Steppe), planted grassland, non-native grassland, and unclassified grassland.

- Within the VAA, cultivated crops occupy the greatest proportion of land, covering 58.2 percent. Shrub/scrub makes up the second largest proportion, covering 23.1 percent. Grassland/herbaceous is the third largest proportion, covering 10.8 percent of the total area.

Lease Boundary

- The dominant habitat mapped in the 2019 NLCD (MRLC n.d.) mapping within the Lease Boundary is cultivated crops, covering 71.3 percent of the total area. The proportional area of cultivated crops mapped in the Lease Boundary is greater than available in the VAA. The proportional area of cultivated crops is comparable to the amount of area mapped as agriculture land by the Applicant's field surveys, which covers 73.8 percent of the total area within the Lease Boundary.

- Shrub/scrub habitat makes up the second largest area within the Lease Boundary, based on the 2019 NLCD (MRLC n.d.), covering 18.4 percent of the total area. The proportional area of shrub/scrub in the Lease Boundary is less than the proportional area available within the VAA. The proportional area of shrub/scrub habitat is more than double the proportional area identified as shrubland by the Applicant. The Applicant's mapping identifies 8.1 percent of the total area within the Lease Boundary as shrubland habitat.

- Grassland/herbaceous habitat makes up the third largest area within the Lease Boundary, based on the 2019 NLCD (MRLC n.d.), covering 5.0 percent of the total area. The proportional area of grassland/ herbaceous habitat in the Lease Boundary is less than the proportional area identified as grassland by the Applicant. The Applicant's mapping identifies 16.9 percent of the total area within the Lease Boundary as grassland habitat.

Wind Energy Micrositing Corridor

- The dominant habitat type mapped in the 2019 NLCD (MRLC n.d.) within the Wind Energy Micrositing Corridor is cultivated crops, covering 75.6 percent of the total area. The proportional area of cultivated crops mapped in the Micrositing Corridor is greater than that available in the VAA. The proportional area of cultivated crops is comparable to the area mapped as agriculture land by the Applicant's field surveys, which covers 77.8 percent of the total area within the Micrositing Corridor.

- Shrub/scrub habitat makes up the second largest area within the Micrositing Corridor, based on the 2019 NLCD (MRLC n.d.), covering 14 percent of the total area. The proportional area of shrub/scrub habitat mapped in the Micrositing Corridor is less than that available in the VAA. The proportional areas of shrub/scrub are more than double the proportional area identified as shrubland habitat by the Applicant. The Applicant's mapping indicates 6.5 percent of the total area within the Micrositing Corridor as shrubland habitat.
- Grassland/herbaceous habitat makes up the fourth largest area within the Micrositing Corridor, based on the 2019 NLCD (MRLC n.d.), covering 3 percent of the total area. The proportional area of grassland/ herbaceous habitat is less than that available in the VAA. The proportional area of grassland/herbaceous habitat is less than the proportional area of grassland habitat identified by the Applicant, which makes up 13.9 percent of the total area.

Solar Siting Areas

- The dominant habitat type in all three Solar Siting Areas is cultivated crops, based on the 2019 NLCD (MRLC n.d.); however, the proportional area of cultivated crops varies among the Solar Siting Areas.
  - The East Solar Field has the smallest mapped area of cultivated crops, covering 57.3 percent of the total area based on the 2019 NLCD (MRLC n.d.). The proportional area of cultivated crops within the East Solar Field is comparable to the proportional area mapped in the VAA. The proportional area of cultivated crops is comparable to the proportional area of agriculture land identified by the Applicant's field surveys, which classified 56.3 percent of the total area as agriculture land.
  - The County Well Solar Field has 90.5 percent of the total area mapped as cultivated crops based on the 2019 NLCD (MRLC n.d.). The County Well Solar Field occupies a larger proportional area of cultivated crops than is available in the VAA. The proportional area of cultivated crops is slightly less than the proportional area of agriculture land identified by the Applicant's field surveys, which classified 96.4 percent of the total area as agriculture land.
  - The Sellards Solar Field has the highest proportion of cultivated crops, with 93.9 percent based on the 2019 NLCD (MRLC n.d.). The Sellards Solar Field occupies a larger proportional area of cultivated crops than is available in the VAA. The proportional area of cultivated crops is slightly more than the proportional area identified by the Applicant's field surveys, which classified 89.8 percent of the total area as agriculture land.
- Shrub/scrub habitat makes up the second largest area within all three Solar Siting Areas, based on the 2019 NLCD (MRLC n.d.); however, the proportional area varies by Solar Siting Area.
  - The East Solar Field has the largest area mapped as shrub/scrub, covering 41.3 percent of the total area from the 2019 NLCD (MRLC n.d.). The proportional area of shrub/scrub within the East Solar Field is greater than the proportional area mapped in the VAA. The shrub/scrub proportional area is greater than the proportional area of shrubland habitat identified by the Applicant's field surveys, which classified 24.5 percent of the total area as shrubland.
  - The County Well Solar Field has 7.9 percent mapped as shrub/scrub, based on the 2019 NLCD (MRLC n.d.). The County Well Solar Field occupies a smaller proportional area of shrub/scrub than is available in the VAA. The shrub/scrub proportional area is greater than the proportional area of

shrubland habitat identified by the Applicant's field surveys, which did not identify any shrubland within the County Well Solar Field.

- The Sellards Solar Field has the lowest proportional area of shrub/scrub, which covers 5.2 percent based on the 2019 NLCD (MRLC n.d.). The Sellards Solar Field occupies a smaller proportional area of shrub/scrub than is available in the VAA. The proportional area of shrub/scrub is greater than the proportional area of shrubland habitat identified by the Applicant's field surveys, which classified 0.6 percent of the total area as shrubland.

- Grassland/herbaceous habitat within the Solar Siting Areas varies but occupies a relatively small area of the total.
  - The East Solar Field has a proportional area of 0.4 percent grassland/herbaceous habitat, based on the 2019 NLCD (MRLC n.d.). The proportional area of grassland/herbaceous habitat within the East Solar Field is less than the proportional area available in the VAA. The grassland/herbaceous habitat proportional area is less than the proportional area of grassland habitat identified by the Applicant's field surveys, which classified 18 percent of the total area as grassland.
  - The County Well Solar Field has 0.6 percent mapped as grassland/herbaceous based on the 2019 NLCD (MRLC n.d.). The County Well Solar Field occupies a smaller proportional area of grassland/herbaceous habitat than is available in the VAA. The grassland/herbaceous proportional area is less than the proportional area of agriculture land identified by the Applicant's field surveys, which identified 2.5 percent of the total area as grassland.
  - The Sellards Solar Field does not include any grassland/herbaceous habitat, based on the 2019 NLCD (MRLC n.d.). The Sellards Solar Field occupies a smaller proportional area of grassland/herbaceous habitat than is available in the VAA. The proportional area of grassland/herbaceous habitat is less than the proportional area of grassland habitat identified by the Applicant's field surveys, which classified 8.3 percent of the total area as grassland.

Based on comparison of the proportional area identified by the 2019 NLCD data (MRLC n.d.) and the field-verified habitat types mapped by the Applicant (**Table 3.5-2**), the 2019 NLCD mapping provided proportional area estimates similar to the Applicant's field mapping for cultivated crops. However, the 2019 NLCD mapping tended to overestimate the amount of shrub/scrub habitat in the Lease Boundary, Wind Energy Micrositing Corridor, and Solar Siting Areas in comparison to the Applicant's mapping. As the Applicant's mapping is field verified, this might mean that the amount of shrub/scrub habitat available within the VAA is also overestimated by the 2019 NLCD. Furthermore, the 2019 NLCD mapping tended to underestimate the amount of grassland/herbaceous habitat within the Micrositing Corridor and Solar Siting Areas in comparison to the Applicant's habitat mapping. This might mean that the amount of grassland/herbaceous habitat available within the VAA is also underestimated by the 2019 NLCD.

From the VAA data, the Micrositing Corridor, Sellards Solar Field, and County Well Solar Field have been sited in areas to maximize cultivated crop land cover, as the proportional area of cultivated crops is greater than available in the VAA.

The 2019 NLCD data are too coarse to identify Priority Habitats; however, the Shrub-steppe Priority Habitat would fall within shrub/scrub, and the Eastside Steppe Priority Habitat would fall within the NLCD grasslands/ herbaceous category. Priority Habitat data obtained from WDFW (WDFW 2022) indicate approximately 67,691.5 acres of Priority Habitat within the VAA. This includes approximately 37,175.7 acres of Eastside Steppe and 30,515.8 acres of Shrub-steppe Priority Habitat. Priority Habitat summaries based on the WDFW data are provided for the VAA, Lease Boundary, and Project components below.

- Eastside Steppe covers 18.3 percent of the VAA, and Shrub-steppe covers 15.1 percent of the VAA.
- Eastside Steppe covers 13.3 percent of the Lease Boundary, and the Shrub-steppe covers 10.2 percent of the Lease Boundary.
- Within the Wind Energy Micrositing Corridor, Eastside Steppe covers 8.1 percent of the total area and Shrub-steppe covers 6.1 percent.
- Within the Solar Siting Areas, Eastside Steppe covers 13.5 percent of the total area and Shrub-steppe covers 7.2 percent.

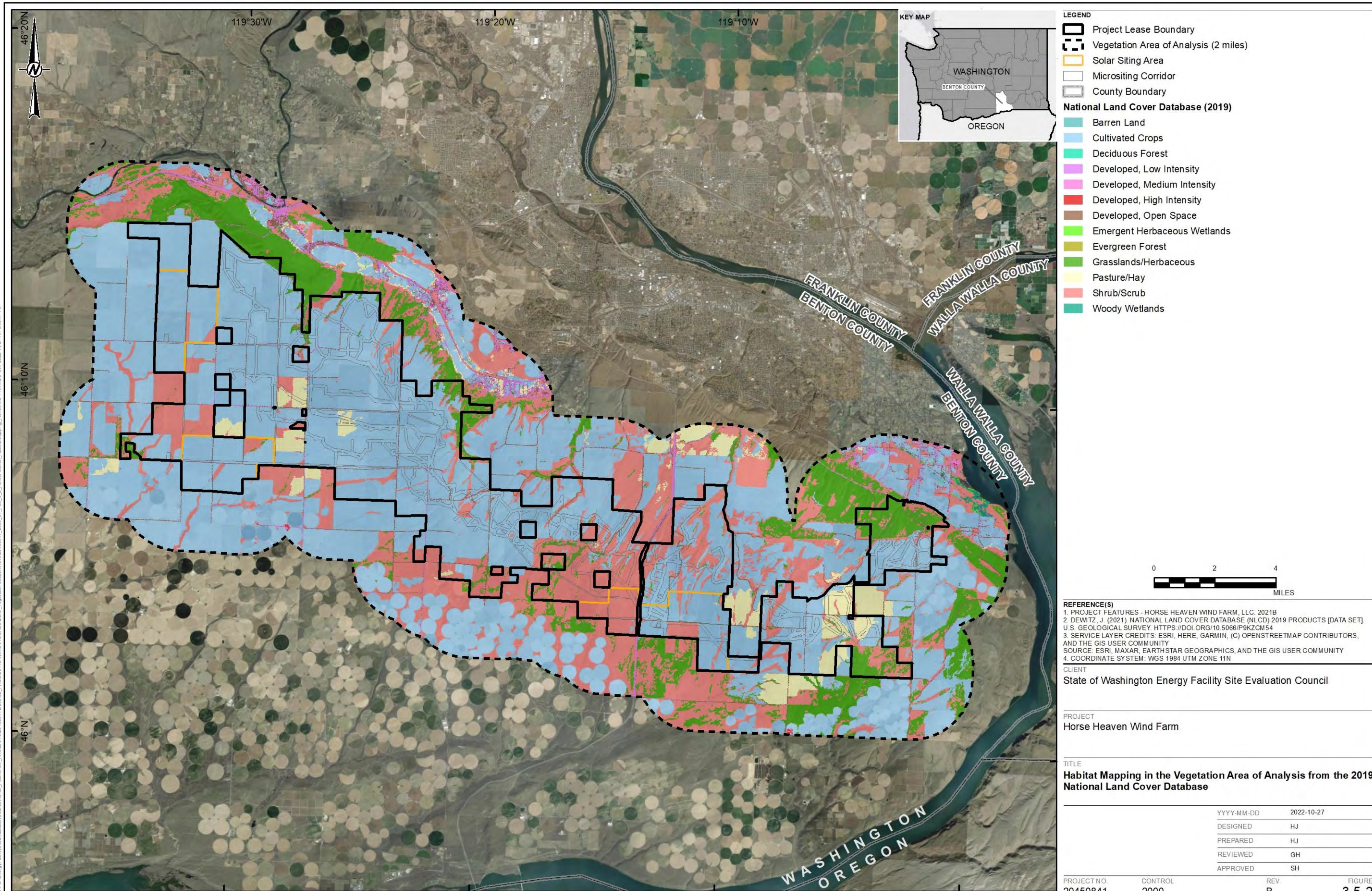
Table 3.5-3: Proportion of Habitat Types in the Vegetation Assessment Area from the National Land Cover Database and the Applicant's Habitat Mapping

Habitat Type/Subtype	Vegetation Assessment Area (%)	Lease Boundary (%)	Micrositing Corridor (%)	East Solar Field (%)	County Well Solar Field (%)	Sellards Solar Field (%)
National Land Cover Database[a]						
Barren Land	<0.1	0	0	0	0	0
Cultivated Crops	58.2	71.3	75.6	57.3	90.5	93.9
Deciduous Forest	<0.1	0	0	0	0	0
Developed, High intensity	<0.1	<0.1	<0.1	0	0	0
Developed, Low intensity	1.3	0.4	0.6	<0.1	0.2	0.1
Developed, Medium intensity	0.4	0.1	0.1	<0.1	<0.1	<0.1
Developed, Open Space	1.8	1.4	2.4	0.8	0.9	0.7
Emergent Herbaceous Wetlands	0.1	<0.1	0	0	0	0
Evergreen Forest	<0.1	0	0	0	0	0
Grasslands/Herbaceous	10.8	5.0	3.0	0.4	0.6	0
Open Water	0.5	<0.1	<0.1	0	0	0
Pasture/Hay	3.7	3.6	4.4	0.1	<0.1	0
Shrub/Scrub	23.1	18.4	14.0	41.3	7.9	5.2
Woody Wetlands	0.1	0	0	0	0	0
Applicant's Habitat Mapping[b]						
Agriculture Land	N/A	73.8	77.9	56.3	96.4	89.8
Developed/Disturbed	N/A	1.2	1.7	1.2	1.0	1.3
Total Grassland	N/A	16.9	13.9	18.0	2.5	8.3
Total Shrubland	N/A	8.1	6.5	24.5	0	0.6

[a] National Land Cover Data (MRLC n.d.)

[b] Calculations were completed using the spatial layers provided by the Applicant and were completed for each Project component independent of the others (Horse Heaven Wind Farm, LLC 2021b). Areas of overlap may occur between Project components (e.g., the Micrositing Corridor may extend into the Solar Siting Area). Total grassland and total shrubland were included rather than the Applicant's habitat subtypes to better align with the NLCD.

N/A = not applicable



Source: MRLC n.d.

Figure 3.5-2: Habitat Mapping in the Vegetation Assessment Area from the 2019 National Land Cover Database

3.5.2.3 Department of Natural Resources Land

The Lease Boundary is primarily sited on privately owned land; however, the Lease Boundary also overlaps with lands managed by the Washington State Department of Natural Resources (DNR). Five parcels of DNR-managed land overlap the Lease Boundary, which are shown in **Figure 3.5-3**.

Characterization of the five parcels of DNR land were provided by a representative of DNR in communication with the Washington Energy Facility Site Evaluation Council (EFSEC) (Unland 2022). The parcels of DNR land are labeled in **Figure 3.5-3** using the Parcel ID.

- Parcel 13686: The DNR land is located within the western end of the Lease Boundary. The area is predominantly agriculture land and invasive annual grassland. The Sellards Solar Field and Wind Energy Micrositing Corridor would intersect this parcel of DNR land.
- Parcel 13687: The DNR land is located within the western end of the Lease Boundary. The area is predominantly agriculture land. The Micrositing Corridor would intersect this parcel of DNR land.
- Parcel 11679: The DNR land is located within the central portion of the Lease Boundary, east of Interstate 82. The area is high in invasive species and of poor quality. The Micrositing Corridor would intersect this parcel of DNR land.
- Parcel 13679: The DNR land is located in the southeast end of the Lease Boundary. Some shrub-steppe habitat occurs within draws but is unlikely to interact with the Project. The Micrositing Corridor would intersect this parcel of DNR land.
- Parcel 11670: The DNR land is located within the eastern end of the Lease Boundary. High-quality shrub-steppe occurs within the draws of these areas, primarily in the northwest corner. The Micrositing Corridor would intersect this parcel of DNR land.

This Page Intentionally Left Blank

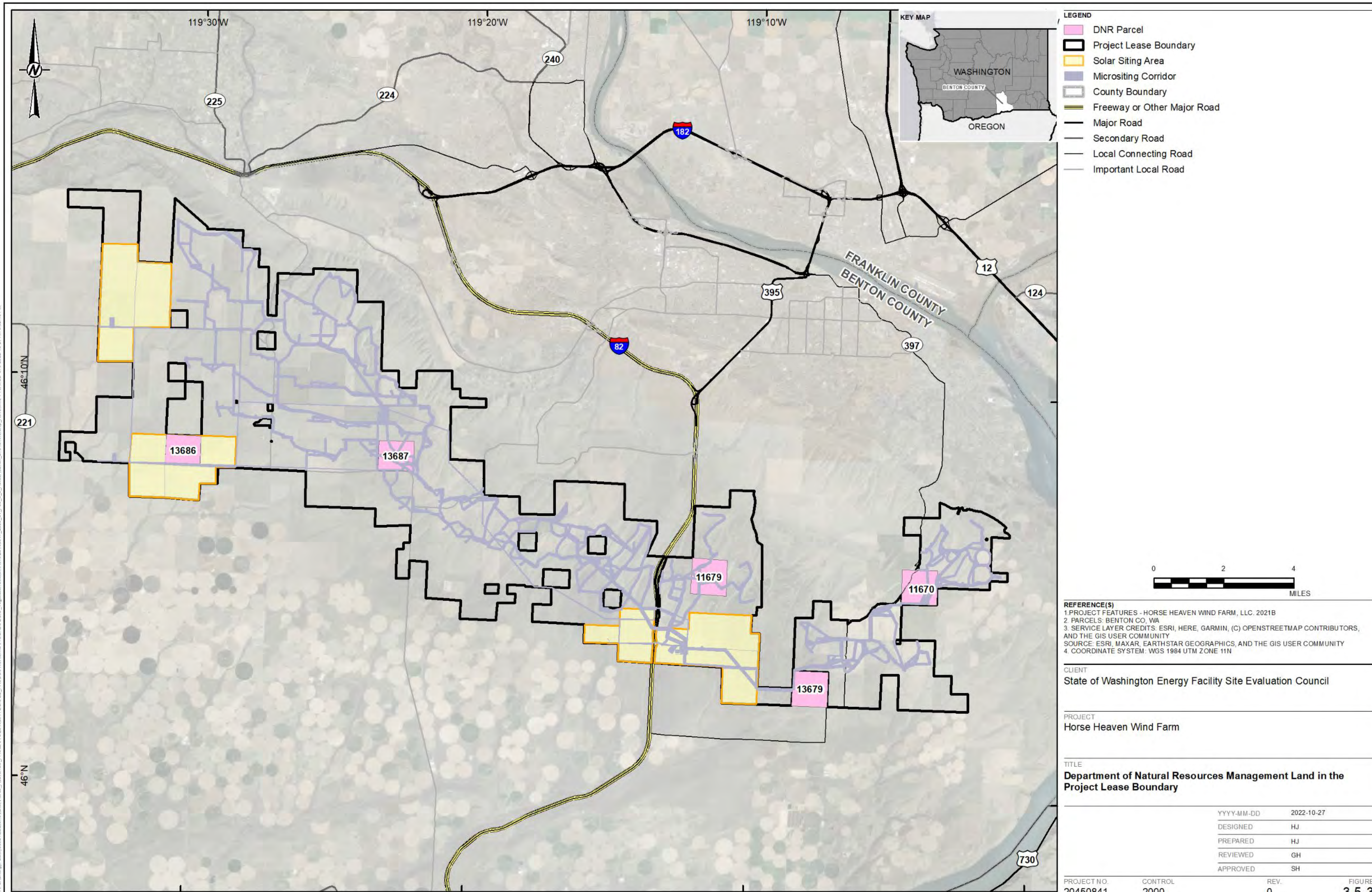


Figure 3.5-3: Department of Natural Resources Management Land in the Project Lease Boundary

3.5.2.4 Priority Habitat

Habitats that are prioritized for conservation and management by WDFW are called Priority Habitats. A Priority Habitat may refer to a unique vegetation association (e.g., shrub-steppe) or a particular habitat feature (e.g., cliffs) (WDFW 2008). Three habitat subtypes identified within the Lease Boundary are considered Priority Habitat. The dwarf shrub-steppe and sagebrush shrub-steppe are both Shrub-steppe Priority Habitat. Shrub-steppe Priority Habitat is a non-forested vegetation type characterized by a conspicuous shrub layer dominated by sagebrush and an understory layer dominated by native perennial bunchgrass (WDFW 2008). The areas classified as Eastside (interior) grassland by Johnson and O'Neil (2001) are synonymous with the Eastside Steppe Priority Habitat (WDFW 2008). Eastside Steppe Priority Habitat is characterized as a non-forested habitat dominated by native perennial bunchgrasses and forbs (WDFW 2008).

Shrub-steppe and Eastside Steppe Priority Habitats are presently limited in the Lease Boundary and surrounding VAA. Most areas suitable for agriculture have been converted to cropland in the vicinity of the Lease Boundary leaving minimal areas as native shrub-steppe or grassland. Native shrub-steppe and grasslands remaining are highly fragmented. Sagebrush shrub-steppe is one of the most at-risk ecosystems in the United States due to fragmentation (USFWS 2014). This trend is consistent for sagebrush shrub-steppe throughout eastern Washington, where sagebrush ecosystems are becoming increasingly fragmented by agriculture, urbanization, energy and natural resource development, and livestock grazing (Knick et al. 2003; USFWS 2014). Smaller areas of remnant ecosystems are less resilient against disturbance. For example, fragmentation that results from development of linear features such as road networks facilitates the introduction and spread of noxious weeds that change vegetation communities (Knick et al. 2003). In addition, the increasing need for energy development has resulted in habitat fragmentation of shrub-steppe. Shrub-steppe naturally has an unequal distribution of resources, and with increased fragmentation, wildlife species dependent on shrub-steppe require increasingly larger areas to obtain necessary food, water, and shelter for survival (USFWS 2014). Further loss of the limited remnant shrub-steppe patches can result in disproportionate impacts on species that require this ecosystem for survival (USFWS 2014).

Tables 3.5-1 and 3.5-2 show the acreage of Priority Habitat within the Lease Boundary and Project Component Areas and in each of the Solar Siting Areas; however, it is also important to understand the quality of the Priority Habitat as measured against reference conditions. Habitat quality is reduced by past and present disturbance but can be improved by activities such as restoration. **Table 3.5-4** provides detailed descriptions of the characteristic vegetation and conditions for Shrub-steppe and Eastside Steppe Priority Habitat types as reference ecosystem conditions, as well as common disturbance indicators, such as invasive plants, which occur in these Priority Habitats (WDFW 2008). This table also provides a detailed description of the Priority Habitats observed within the Lease Boundary, in addition to the disturbance observed on site during field surveys. The location of identified Priority Habitat is provided in **Figure 3.5-1** (Horse Heaven Wind Farm, LLC 2021a).

As shown in **Table 3.5-4**, most of the Priority Habitat areas observed in the Wind Energy Micrositing Corridor and Solar Siting Areas, where field surveys were conducted, are already fragmented by agriculture and have undergone some degree of impact from invasive plants. However, these areas are some of the only intact Shrub-steppe and Eastside Steppe ecosystems remaining within the vicinity of the Lease Boundary. Within the Lease Boundary, Priority Habitat is limited to the northern edge, draws and canyons, and areas around the East Solar Field, as shown in **Figure 3.5-1**. Within the VAA, potential Priority Habitat is limited to the northern slope of the Horse Heaven Hills, the central area near the East Solar Field, and small patches in the south, as shown in **Figure 3.5-2**.

Table 3.5-4: WDFW Priority Habitat Description for Reference Ecosystems and Corresponding Habitat Types in the Lease Boundary

WDFW Priority Habitat	Description of WDFW Priority Habitat[(a)]	ASC Priority Habitat Subtype and Location in the Lease Boundary	Description of Habitat Subtype in Lease Boundary Based on Conditions Observed on Site[(b)]	Disturbance Observed during Field Surveys in Priority Habitat on Site[(b)]
Shrub-steppe	▪ Dominated by bunchgrasses and a conspicuous layer of shrubs ▪ **Indicator shrubs:** big sagebrush (*Artemisia tridentata*), antelope bitterbrush (*Purshia tridentata*), threetip sagebrush (*Artemisia tripartita*), scabland sagebrush (*Artemisia rigida*), dwarf sagebrush (*Artemisia arbuscula*) ▪ **Indicator grasses:** bunchgrasses - Idaho fescue (*Festuca idahoensis*), bluebunch wheatgrass (*Pseudoroegneria spicata*), Sandberg bluegrass (*Poa secunda*), Thurber's needlegrass (*Achnatherum thurberianum*), needle-and-thread grass (*Hesperostipa comata*) ▪ Forb layer variable depending on precipitation ▪ Disturbed sites have an increase of non-natives such as cheatgrass (*Bromus tectorum*) or crested wheatgrass (*Agropyron cristatum*)	**Dwarf shrub-steppe (rock buckwheat/ Sandberg bluegrass dwarf shrub)** ▪ Mapped within the Micrositing Corridor in the northwest corner of the Lease Boundary	▪ **Shrub layer:** rubber rabbitbrush (*Ericameria nauseosa*), green rabbitbrush (*Chrysothamnus viscidiflorus*), big sagebrush ▪ **Grass layer:** bluebunch wheatgrass and Sandberg bluegrass ▪ **Forb layer:** dominated by the native sub-shrub/dwarf shrub rock buckwheat (*Eriogonum sphaerocephalum*), with common yarrow (*Achillea millefolium*), rosy balsamroot (*Balsamorhiza rosea*), hoary aster (*Dieteria canescens*), Douglas' dustymaidens (*Chaenactis douglasii*), cushion fleabane (*Erigeron poliospermus*), narrowleaf goldenweed (*Nestotus stenophyllus*) ▪ **Lithosol soils** ▪ **Invasive species:** cheatgrass, cereal rye (*Secale cereale*), tall tumblemustard (*Sisymbrium altissimum*), yellow salsify (*Tragopogon dubius*)	▪ Invasive grasses (cheatgrass and cereal rye) indicated as dominant species in the dwarf shrub-steppe.
		Sagebrush shrub-steppe ▪ North-central and northeastern part of the Lease Boundary, mainly restricted to hillslopes and drainages that are too steep for agricultural production	▪ **Shrub layer:** big sagebrush dominant with spineless horsebrush (*Tetradymia canescens*), rubber rabbitbrush, green rabbitbrush ▪ **Grass layer:** bluebunch wheatgrass, Sandberg bluegrass, needle-and-thread grass ▪ **Forb layer:** Carey's balsamroot (*Balsamorhiza careyana*), common yarrow, long-leaf phlox (*Phlox longifolia*), low pussytoes (*Antennaria dimorpha*), shaggy fleabane (*Erigeron pumilus*), woolly plantain (*Plantago patagonica*), woollypod milkvetch (*Astragalus purshii*), sagebrush mariposa lily (*Calochortus macrocarpus* var. *macrocarpus*), wild blue flax (*Linum lewisii*) ▪ **Invasive species:** cheatgrass, redstem stork's bill (*Erodium cicutarium*), prickly lettuce (*Lactuca serriola*), yellow salsify, bulbous bluegrass (*Poa bulbosa*), cereal rye, Russian thistle (*Salsola tragus*), tall tumblemustard	▪ Habitat described as fragmented. ▪ Degraded from the high cover of non-native grass and forb species and/or grazing. ▪ Evidence of past wildfires was noted (presence of burned shrubs).

Table 3.5-4: WDFW Priority Habitat Description for Reference Ecosystems and Corresponding Habitat Types in the Lease Boundary

WDFW Priority Habitat	Description of WDFW Priority Habitat[(a)]	ASC Priority Habitat Subtype and Location in the Lease Boundary	Description of Habitat Subtype in Lease Boundary Based on Conditions Observed on Site[(b)]	Disturbance Observed during Field Surveys in Priority Habitat on Site[(b)]
Eastside Steppe	▪ Dominated by forbs and grasses ▪ Shrubs are absent or scattered ▪ **Indicator grasses:** bluebunch wheatgrass, Idaho fescue, Sandberg bluegrass, rough fescue, or needlegrass ▪ Disturbed sites have an increase of cheatgrass, spotted knapweed (*Centaurea stoebe*), yellow starthistle (*Centaurea solstitialis*), or Kentucky bluegrass (*Poa pratensis*)	**Eastside (interior) grassland** (Eastside Steppe) Mapped in three locations: East Solar Field, Badger Canyon, and an ephemeral drainage	▪ **Shrub layer:** rabbitbrush, green rabbitbrush (<5% cover) ▪ **Grass layer:** bluebunch wheatgrass, Great Basin wildrye (*Leymus cinereus*), needle-and-thread, Sandberg bluegrass ▪ **Forb layer:** Carey's balsamroot, lupine (*Lupinus* sp.), common yarrow, Spalding's milkvetch (*Astragalus spaldingii*), shaggy fleabane, fiddleneck (*Amsinckia* sp.), triternate biscuitroot (*Lomatium triternatum*), wild blue flax, common yarrow, woollypod milkvetch, woolly plantain ▪ **Invasive species:** cheatgrass, tall tumblemustard, bulbous bluegrass, cereal rye, prickly lettuce, yellow salsify, common stork's-bill	▪ The ephemeral drainage was degraded due to the high cover of invasive plants. ▪ The habitat quality on the east side of Badger Canyon was higher than the other Eastside (interior) grassland (Eastside Steppe) surveyed due to lower invasive plant cover and fewer evidence of cattle grazing). ▪ No young sagebrush observed in Badger Canyon except trace rubber rabbitbrush.

Sources:
(a) Description of Priority Habitat based on descriptions available from WDFW (2008).
(b) Description of the Priority Habitat subtypes obtained from Horse Heaven Wind Farm, LLC (2021a) and Tetra Tech (2021) based on the observed site conditions.

3.5.3 Special Status Species

The Applicant defined the term “special status plant” to include federally listed endangered, threatened, or candidate vascular plant species and state-listed endangered, threatened, and sensitive vascular plant species as defined by the Washington Natural Heritage Program (WNHP) (Tetra Tech 2021). In this Draft EIS, the term “special status” is expanded to include federally listed endangered, threatened, or candidate non-vascular plant species and lichen species and state-listed endangered, threatened, and sensitive non-vascular plant species and lichen species as defined by the WNHP (DNR 2021).

The Applicant conducted a background search for special status plant species. Twenty-nine special status plant species and one special status lichen species were identified as having the potential to occur within the Lease Boundary (Appendix K, Horse Heaven Wind Farm, LLC 2021a; Attachment A, Tetra Tech 2021). Surveys for special status vascular plants were conducted within the Wind Energy Micrositing Corridor and Solar Siting Areas in 2020 and 2021. No special status vascular plants were observed during the field surveys (Horse Heaven Wind Farm, LLC 2021a; Tetra Tech 2021). A complete list of vascular plants observed during field surveys is provided in Appendix K of the ASC (Horse Heaven Wind Farm, LLC 2021a) and Attachment B of the 2021 Botany and Habitat Survey Report for Horse Heaven Wind Farm (Tetra Tech 2021).

The background review identified one special status lichen species, woven spore lichen (*Texosporium sancti-jacobi*), as potentially occurring within the Lease Boundary. Four occurrences of woven spore lichen were documented within 3 miles of the Lease Boundary, with the closest occurrence documented approximately 0.4 miles north of the Lease Boundary (Tetra Tech 2021). Field surveys conducted by the Applicant focused on identifying vascular special status plants and did not include non-vascular plants or lichens. Woven spore lichen has not been reported on any of the DNR-managed land that overlaps the Lease Boundary (Unland 2022). Tetra Tech assessed the habitat types within the Wind Energy Micrositing Corridor and Solar Siting Areas to identify potentially suitable habitats for woven spore lichen as part of the 2021 Botany and Habitat Survey Report for Horse Heaven Wind Farm (Attachment C, Tetra Tech 2021). Based on the assessment, approximately 18.9 acres are rated as potentially suitable for woven spore lichen. The area of suitable habitat corresponds to 10.9 acres of dwarf shrub-steppe and 8.0 acres of sagebrush shrub-steppe, located within the Micrositing Corridor.

The WNHP is Washington’s primary source of information about rare and endangered plant species and threatened ecosystems. Data were obtained from the WNHP and queried to identify special status species within the VAA (WNHP 2022).

Based on the habitat characteristics and habitat types available within the Lease Boundary, the special status species with the potential to occur in the Wind Energy Micrositing Corridor and Solar Siting Areas are given a rating for the potential of occurrence. The following ratings and definitions were used to describe the potential for occurrence:

- **Negligible:** No known occurrences in the VAA and no suitable habitat within the Lease Boundary, may also be used to describe species presumed extirpated
- **Unlikely:** No known occurrence in the VAA but suitable habitat within the Lease Boundary
- **Potential:** Known occurrence in the VAA and suitable habitat within the Lease Boundary
- **Likely:** Known occurrence within the Lease Boundary and suitable habitat within the Lease Boundary

- **Confirmed:** Known occurrence in areas associated with the Wind Energy Micrositing Corridor or Solar Siting Areas

Three records of special status species were obtained from the WNHP that occur within the VAA. Two of the species are known only from historical occurrences. Two records of woven spore lichen, documenting four locations in the VAA, are known to occur from extant records. **Table 3.5-5** summarizes the records of special status species, including the state status, description of the habitat requirements, and potential to occur within the Lease Boundary. Distances are provided from the nearest Project component; however, locations of special status species are sometimes imprecise depending on record age or to obscure precise locations to protect the species.

Table 3.5-5: Special Status Plant Species Documented in the Vegetation Assessment Area

Scientific Name	Common Name	State Status[(a)]	Location[(b)]	Habitat Characteristics[(c)]	Potential to Occur within the Lease Boundary
Vascular Plants					
Astragalus kentrophyta var. *douglasii*[(d)]	thistle milkvetch	X	Record occurs east of the Lease Boundary approximately 0.3 miles from the Micrositing Corridor at the nearest point.	Species grow in sandy substrate, in sand dunes, or along riverbanks. Restricted to low elevations, up to 400 feet.	Negligible: species is presumed extirpated from Washington State and record in the VAA is historical (from 1883), no suitable habitat in the Lease Boundary.
Cryptantha leucophaea[(d)]	gray cryptantha	T	Record occurs east of the Lease Boundary approximately 0.5 miles from the Micrositing Corridor at the nearest point.	Found in sandy substrate, primarily sand dunes, from 300 to 2,500 feet in elevation. Associated with sagebrush shrub-steppe species. Record occurs near the Columbia River. This species is endemic to the Columbia and lower Yakima Rivers.	Unlikely: record in the VAA is historical (from 1922). Primarily occurs in sand dunes but suitable habitat may occur in sagebrush shrub-steppe.
Lichen					
Texosporium sancti-jacobi	woven spore lichen	T	All locations are located northwest of the Lease Boundary. The closest record is 0.6 miles north of the Micrositing Corridor.	Occurs in relatively undisturbed areas dominated by native plants such as sagebrush (*Artemisia tridentata*), bitterbrush (*Purshia tridentata*), Idaho fescue (*Festuca idahoensis*), and bluebunch wheatgrass (*Pseudoroegneria spicata*). Analysis of the habitat on site identified 18.9 acres of potentially suitable habitat for woven sport lichen in dwarf shrub-steppe and sagebrush shrub-steppe habitat.	Potential: known occurrences in the VAA and suitable habitat in the dwarf shrub-steppe and sagebrush shrub-steppe habitats within the Lease Boundary.

(a) State Status obtained from WNHP (2021a) and WNHP (2011). State status definitions are provided below (WNHP 2021a):
X = Presume extirpated. Species have not been successfully relocated since 1978.
E = Endangered. A species, subspecies, or variety in danger of extinction throughout all or a significant portion of its range.
T = Threatened. A species, subspecies, or variety likely to become Endangered in the foreseeable future.
P = Proposed. A species, subspecies, or variety formally proposed for listed as Endangered or Threatened.
(b) Location information obtained from WDFW (n.d.).
(c) Sources for habitat characteristics: Tetra Tech (2021); WNHP (2021b, 2022)
(d) Historical record
VAA = Vegetation Area of Analysis

3.5.4 Noxious Weeds

The term "noxious weeds" refers to plants legally designated as such in Washington State and Benton County. Noxious weeds in Washington are categorized into one of three classes based on their distribution within the state and the requirements for treatment. The three classes of noxious weeds are described below.

- Class A noxious weeds are non-native species that have a limited distribution in Washington State. Objectives are to eradicate existing infestations and prevent new ones. Eradication is required by law. There are 38 species of non-native plants that are classified as Class A noxious weeds in Benton County and the State of Washington (BCNWCB n.d.; WSNWCB n.d.).
- Class B noxious weeds are non-native species that occur only in portions of Washington State. Mandatory control is required in regions where these species are not yet widespread, and the prevention of new infestations is the primary goal. There are 66 species of non-native plants that are classified as Class B noxious weeds in Benton County and the State of Washington (BCNWCB n.d.; WSNWCB n.d.).
- Class C noxious weeds are already widespread in Washington or are of special interest to the agricultural industry. A county can enforce control of Class C noxious weeds if it is beneficial to that county. There are 52 species of non-native plants that are classified as Class C noxious weeds in Benton County and the State of Washington (BCNWCB n.d.; WSNWCB n.d.).

Surveys for noxious weeds were completed in 2020 and 2021 within the Micrositing Corridor and Solar Siting Areas, covering approximately 21,076 acres (Horse Heaven Wind Farm, LLC 2021a; Tetra Tech 2021). An additional 604 acres within the Sellards Solar Siting Area have not been surveyed for noxious weeds (Tetra Tech 2021). A summary of noxious weeds documented during field surveys is provided in **Table 3.5-6**. The locations of noxious weeds observed during field surveys are available in Appendix K-17 of the ASC (Horse Heaven Wind Farm, LLC 2021a) and Figures 4a through 4i in Tetra Tech (2021).

Three noxious weeds are abundant throughout the Wind Energy Micrositing Corridor and Solar Siting Areas: kochia (*Bassia scoparia*), rush skeletonweed (*Chondrilla juncea*), and cereal rye (*Secale cereale*).

Table 3.5-6: Noxious Weeds Observed during Field Surveys Conducted in 2020 and 2021 in the Wind Energy Micrositing Corridor and Solar Siting Areas

Scientific Name	Common Name	State and County Status[a]	Frequency
Bassia (Kochia) scoparia	kochia	B	Abundant. Frequently observed throughout the Micrositing Corridor and Solar Siting Areas.
Centaurea sp.	knapweed	B	Frequently observed in the central portion of the Micrositing Corridor and Solar Siting Areas. Several occurrences in the eastern and western portion of the Micrositing Corridor and Solar Siting Areas.
Centaurea solstitialis	yellow starthistle	B	Observed at two locations in the central portion of the Micrositing Corridor and Solar Siting Areas. Not observed during 2021 surveys.

Table 3.5-6: Noxious Weeds Observed during Field Surveys Conducted in 2020 and 2021 in the Wind Energy Micrositing Corridor and Solar Siting Areas

Scientific Name	Common Name	State and County Status[(a)]	Frequency
Chondrilla juncea	rush skeletonweed	B	Abundant. Frequently observed throughout the Micrositing Corridor and Solar Siting Areas.
Convolvulus arvensis	field bindweed	C	Observed at two locations in the eastern portion of the Micrositing Corridor and Solar Siting Areas. Not observed during 2020 surveys.
Onopordum acanthium	Scotch thistle	B	Observed at seven locations in the Micrositing Corridor and Solar Siting Areas.
Secale cereale	cereal rye	C	Abundant. Frequently observed through the Micrositing Corridor and Solar Siting Areas.

Sources: Horse Heaven Wind Farm, LLC 2021a; Tetra Tech 2021
Notes:
(a) Class B noxious weeds: Non-native species presently limited to portions of Washington State. Species are designated for required control in regions where they are not yet widespread. Preventing new infestations in these areas is a high priority. In regions where Class B species are already abundant, control is decided at the local level, with containment as the primary goal (BCNWCB n.d.; WSNWCB n.d.).

Class C noxious weeds: Non-native species that are widespread in Washington State or are of special interest to the state's agricultural industry. The Class C status allows county weed boards to require control if locally desired, or they may choose to provide education or technical consultation (BCNWCB n.d.; WSNWCB n.d.).

Field surveys also identified non-native plants within the Wind Energy Micrositing Corridor and Solar Siting Areas, which are shown in **Table 3.5-7** (Horse Heaven Wind Farm, LLC 2021a; Tetra Tech 2021). A non-native plant is a species of plant that has been introduced to an area or occurs outside its native range. Similar to noxious weeds, non-native plants can exhibit characteristics that make them competitive against native plants; however, the species listed in **Table 3.5-7** are not legally designated.

Table 3.5-7: Non-native Plants Observed during Field surveys in 2020 and 2021 in the Wind Energy Micrositing Corridor and Solar Siting Areas

Scientific Name	Common Name	Lifeform
Agropyron cristatum	crested wheatgrass	Grass
Amaranthus blitoides	matweed, prostrate pigweed	Forb
Bromus arvensis	field brome/Japanese brome	Grass
Bromus hordeaceus	soft brome	Grass
Bromus tectorum	cheatgrass	Grass
Ceratocephala testiculata	burr buttercup	Forb
Chorispora tenella	blue mustard	Forb
Descurainia sophia	flixweed	Forb
Draba verna	spring whitlow-grass	Forb
Erodium cicutarium	redstem, common stork's-bill, crane's-bill	Forb
Holosteum umbellatum	jagged-chickweed	Forb
Hordeum murinum	mouse barley	Grass

Table 3.5-7: Non-native Plants Observed during Field surveys in 2020 and 2021 in the Wind Energy Micrositing Corridor and Solar Siting Areas

Scientific Name	Common Name	Lifeform
Lactuca serriola	prickly lettuce	Forb
Lappula longispina	long-spined stickseed	Forb
Poa bulbosa	bulbous bluegrass	Grass
Polygonum aviculare	prostrate knotweed	Forb
Polypogon monspeliensis	annual rabbit's-foot grass	Forb
Robinia pseudoacacia	black locust	Tree
Salsola tragus	prickly Russian thistle	Forb
Sisymbrium altissimum	tall tumblemustard	Forb
Taraxacum officinale	common dandelion	Forb
Tragopogon dubius	yellow salsify	Forb
Triticum aestivum	wheat	Grass
Vulpia bromoides	brome fescue	Grass

Sources: Horse Heaven Wind Farm, LLC 2021a; Tetra Tech 2021

This Page Intentionally Left Blank

3.6 Wildlife and Habitat

This section describes the wildlife and supporting habitat in the proposed Horse Heaven Wind Farm (Project, or Proposed Action) Lease Boundary, including a 2-mile buffer (Wildlife Area of Analysis). Section 4.6 presents an analysis of the Project's potential impacts on wildlife and supporting habitat. The information provided herein is based on the detailed description of vegetation communities and habitat characteristics in Section 3.5 Vegetation.

Regulatory Setting

Regulations protecting special status species are presented in Section 3.6.2. A comprehensive list is presented in Section 4.6.2 and are listed in Table 4.5-3.

3.6.1 Relevant Data Sources

The description of the affected environment provided in Section 3.6.2 was developed based on information provided by Horse Heaven Wind Farm, LLC (Applicant), as well as government and publicly available literature. No field studies were conducted specifically for the development of this Draft Environmental Impact Statement (EIS). The Wildlife Area of Analysis is consistent with the analysis area used in Section 3.5, Vegetation, which encompasses approximately 202,289 acres and includes the Lease Boundary plus an additional 2-mile buffer. Habitat acreages were independently calculated for the Draft EIS from spatial data provided by the Applicant (Horse Heaven Wind Farm, LLC 2021b). These spatial data were used to assess each Project component independent of the others. A description of methods used to calculate affected habitats is provided in Section 3.5.

3.6.2 Affected Environment

3.6.2.1 Wildlife Habitat

Wildlife habitat in the Lease Boundary consists of a mix of natural (native shrub-steppe) and anthropogenically altered areas broadly characterized as native shrubland (e.g., dwarf shrub-steppe, sagebrush shrub-steppe, rabbitbrush), grassland that includes native steppe habitat, and agricultural/disturbed land (e.g., developed land). The Applicant mapped habitat types based on habitat descriptions provided in Washington Department of Fish and Wildlife (WDFW) (2009) and Johnson and O'Neil (2001). **Table 3.6-1** summarizes the composition of vegetation communities in the Project Lease Boundary. The distribution of these communities is depicted in **Figure 3.6-1.**

Table 3.6-1: Lease Boundary Habitat Composition

Habitat Type/Subtype	Lease Boundary (acres)[(a)]	Wind Energy Micrositing Corridor (acres)[(a)]	Solar Siting Areas (acres)[(a)]	Substation Areas (acres)[(a)]	BESS Areas (acres)[(a)]	Percentage of Habitat Type Available in Lease Boundary within Project Component Areas
Agriculture land	53,450.1	9,219.3	8,409.0	36.6	18.1	33.0%
Developed/disturbed	835.7	206.5	128.8	0	0	40.1%
Grassland						
Eastside (interior) grassland (Eastside Steppe)[(b)]	173.5	56.8	153.3	0	0	100%
Non-native grassland	1,635.5	656.5	451.4	1.6	0	67.7%
Planted grassland	4,338.3	934.1	519.4	0	0	33.5%
Unclassified grassland[(c)]	6,125.2	0	0	0	0	0%
Shrubland						
Dwarf shrub-steppe[(b)]	23.2	20.8	0	0	0	89.7%
Rabbitbrush shrubland	3,037.7	560.3	1,024.9	0	0	52.2%
Sagebrush shrub-steppe[(b)]	1,372.0	190.1	67.9	0	0	18.8%
Unclassified shrubland[(c)]	1,436.6	0	<0.1	0	0	0%
Total	**72,427.9**	**11,844.5**	**10,754.7**	**38.2**	**18.1**	

Sources: Horse Heaven Wind Farm, LLC 2021b; Tetra Tech 2021a

Notes:

(a) Calculations of areas were completed independently using spatial data provided by the Applicant. (Horse Heaven Wind Farm, LLC. 2021b). Areas of overlap may occur between Project components (e.g., the Wind Energy Micrositing Corridor may extend into the Solar Siting Areas).

(b) Priority Habitats in the State of Washington (WDFW 2008).

(c) Unclassified grassland and unclassified shrubland habitat subtypes include the areas mapped during surveys conducted in 2018 or using National Land Cover Database data that were not further classified into subtypes (e.g., planted grassland, sagebrush shrub-steppe) during the 2020 and 2021 field surveys or 2020 desktop analysis.

BESS = battery energy storage facility

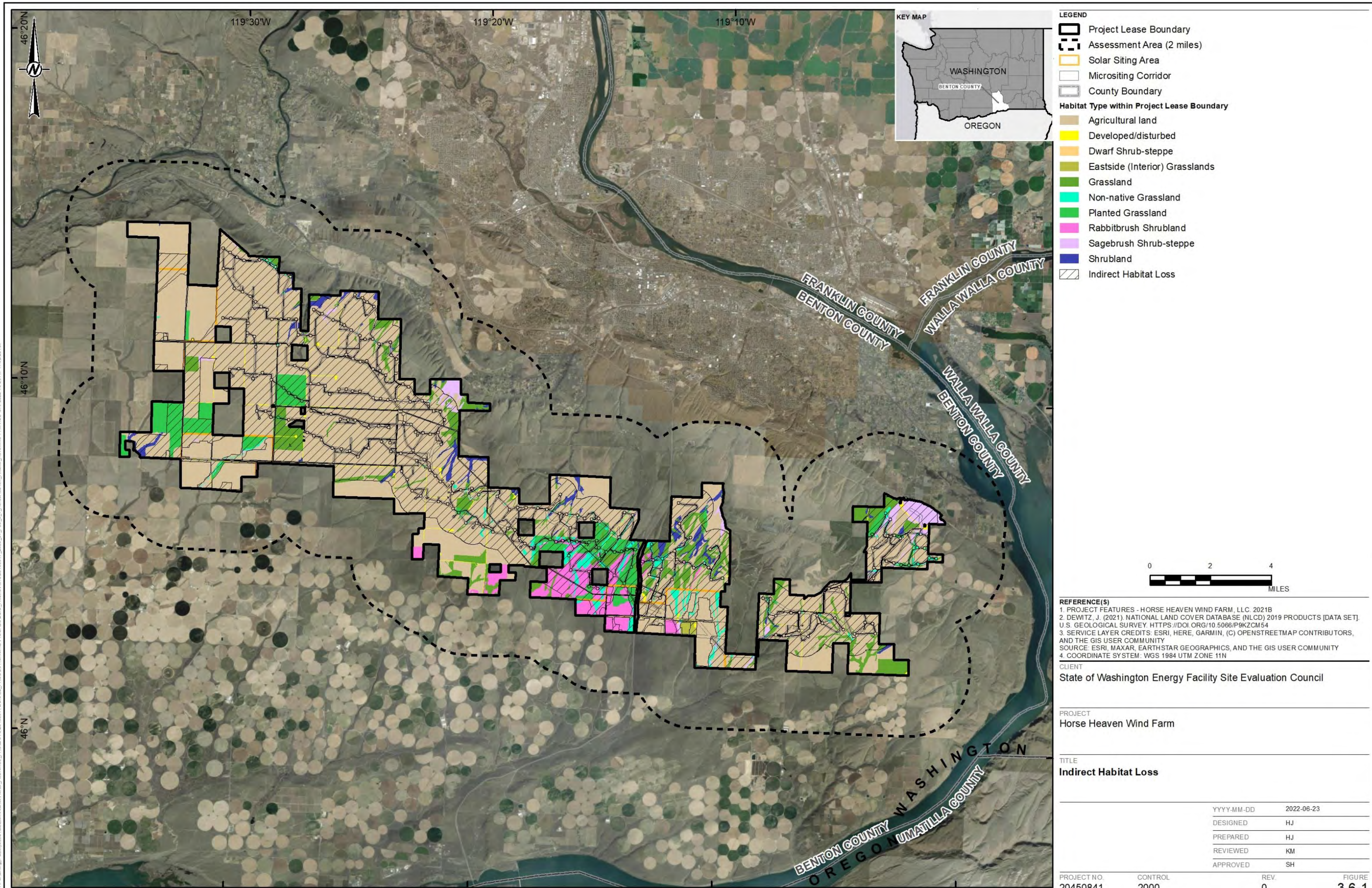


Figure 3.6-1: Indirect Habitat Loss

Agricultural land accounts for the majority (approximately 74 percent) of the Lease Boundary and consists of active and fallow wheat fields (Horse Heaven Wind Farm, LLC 2021a). Agricultural lands are distributed throughout the Lease Boundary.

Developed and disturbed areas within the Lease Boundary are generally unvegetated and include roads, buildings, gravel pits, and other structures. Developed areas are distributed throughout the Lease Boundary and include linear features (e.g., roadways) or small polygons (developed areas less than 30 acres).

Grassland is the second most common habitat type in the Lease Boundary (approximately 17 percent) and includes Eastside (interior) grassland, non-native grasslands, planted grasslands, and unclassified grasslands. Eastside (interior) grassland is dominated by native perennial grasses, including bluebunch wheatgrass (*Pseudoroegneria spicata*), Sandberg's bluegrass (*Poa secunda*), and Great Basin wildrye (*Leymus cinereus*), with a diverse herb layer (e.g., forbs such as flowering plants). This habitat type was mapped in small areas within the portion of the Micrositing Corridor that crosses Badger Canyon and within the East Solar Field (Tetra Tech 2021a). Non-native grasslands are areas dominated by non-native grass species, such as cereal rye (*Secale cereale*) and cheatgrass (*Bromus tectorum*), with lesser amounts of native species. This habitat type was more frequently mapped on the hilltop and draws in the Lease Boundary (Horse Heaven Wind Farm, LLC 2021a). Planted grasslands are areas that may be included in the U.S. Department of Agriculture Conservation Reserve Program (CRP) and are characterized as planted areas dominated by native or non-native grass species. Some of the planted grassland also included dense areas of rabbitbrush. Planted grasslands were predominantly mapped in the western (north of the proposed Webber Canyon substation) and central (north of the Bofer Canyon substation) portions of the Lease Boundary. Unclassified grasslands are areas mapped as herbaceous land; however, these were not further classified into one of the other grassland subtypes (Horse Heaven Wind Farm, LLC 2021b). This classification is used for the portion of the Lease Boundary that lies outside the Wind Energy Micrositing Corridor and Solar Siting Areas, where field data are limited. This habitat type is frequently mapped along hills and draws but also occurs elsewhere in the Lease Boundary.

Shrubland habitat is described as areas where shrubs account for a minimum of 5 percent of vegetation cover. Shrubland is further refined into dwarf shrub-steppe, rabbitbrush shrubland, and sagebrush shrub-steppe, based on background and field data, or unclassified shrubland where further classification was not possible (Horse Heaven Wind Farm, LLC 2021a). Dwarf shrub-steppe habitat was mapped in one polygon (23 acres) on a ridgetop in the northwest corner of the Lease Boundary. Rabbitbrush was reported to typically occur in areas understood to be former agricultural lands and could have been, or are, enrolled in the CRP. This habitat type was recorded in the central-eastern portion of the Lease Boundary near Prospect Canyon and Bofer Canyon (2,517 acres). Sagebrush shrub-steppe (1,261 acres) was mapped in the north-central and northeastern portions of the Lease Boundary, often associated with ridges and canyons. Unclassified shrubland (1,719 acres) includes shrublands that could not be further classified from background resources and are mapped as shrub/scrub by the National Land Cover Database.

One wetland, approximately 0.03 acres in size, has been recorded in Badger Canyon within the Lease Boundary. The wetland is in a draw approximately 240 feet west of the Micrositing Corridor.

Three of the habitat types documented in the Lease Boundary—sagebrush shrub-steppe, dwarf shrub-steppe,[5] and Eastside (interior) grassland[6]—are considered priority habitat by Washington State. These are described further in Section 3.5.2.

3.6.2.2 Wildlife

Wildlife presence and use of the Lease Boundary was assessed using background resources (e.g., databases maintained by Washington State) and field-based data collected by the Applicant.

General Wildlife

Amphibians

Three amphibian species—Woodhouse's toad (*Anaxyrus woodhousii*), Great Basin spadefoot (*Spea intermontana*), and Pacific treefrog (*Pseudacris regilla*)—have ranges that overlap the Lease Boundary and Wildlife Area of Analysis based on the Gap Analysis[7] Predicted Distribution mapping produced by the Washington NatureMapping Program (NatureMapping n.d.). Woodhouse's toads are associated with sagebrush, riparian areas, and prairie fields along the Snake and Columbia Rivers (NatureMapping n.d.). Woodhouse's toad is considered a species of greatest conservation need under the State Wildlife Action Plan (SWAP) (WDFW 2015). Great Basin spadefoots are associated with natural and anthropogenic permanent and temporary aquatic habitats such as ponds, ditches, dugouts, and vernal pools. Pacific treefrogs occur in most habitats with access to breeding sites, and the Lease Boundary is within the core habitat for this species (NatureMapping n.d.). The Applicant reports that suitable natural or anthropogenic breeding habitats are not available in the Lease Boundary, although wetland habitat has been recorded in Badger Canyon, approximately 790 feet (240 meters) west of the Micrositing Corridor, which may provide breeding habitat if wetted during the breeding season (spring to early summer).

Reptiles

Five snakes (common garter snake [*Thamnophis sirtalis*], gopher snake [*Pituophis catenifer*], western racer [*Coluber constrictor*], striped whipsnake [*Masticophis taeniatus*], and western rattlesnake [*Crotalus oreganus*]) and three lizards (sagebrush lizard [*Sceloporus graciosus*], pygmy short-horned lizard [*Phrynosoma douglasii*], and side-blotched lizard [*Uta stansburiana*]) have ranges that overlap with the Lease Boundary. Two of these species, striped whipsnake and sagebrush lizard, are candidates for listing as endangered, threatened, or sensitive in Washington State and are discussed further in subsequent sections (WDFW 2021a). Side-blotched lizard and pygmy short-horned lizard are also listed as a species of greatest conservation need under the SWAP (WDFW 2015).

In general, regionally occurring snake and reptile species exhibit a patchy distribution and are associated with shrubland, grassland, and canyons with access to suitable hibernacula (winter shelter used for hibernation) or hibernation habitat (e.g., loose soils for burrowing). In the Lease Boundary, it is expected that suitable reptile living habitat is available in native shrub and grassland areas, as well as planted grasslands. Reptiles may also

---

[5] Sagebrush shrub-steppe and dwarf shrub-steppe are part of the Shrub-steppe Priority Habitat in Washington State (WDFW 2008).

[6] The areas identified by the Applicant as Eastside (interior) grassland are considered Eastside Steppe Priority Habitat in Washington State (WDFW 2008).

[7] Gap Analysis is a process of identifying areas of high conservation priority. It is designed to be a proactive approach to conservation. Gap relies on information from current landcover and terrestrial vertebrates to identify habitat types and species that are poorly represented on reserves (NatureMapping n.d.).

occur in agricultural areas and along roadways if suitable basking and shelter habitat is available for thermoregulation.

Birds

A total of 66 bird species were reported in the Lease Boundary from field-based studies conducted by the Applicant, including 29 small bird species and 37 large bird species. The Applicant reports that the species recorded during surveys are typical of species occurring in regional arid shrub-steppe, agriculture, and grassland habitats. Horned lark (*Eremophila alpestris*) was the most common small bird species observed (5.3 observations per 100-meter [328-foot] plot per 10-minute survey) in both the eastern and western portions of the Lease Boundary and was most commonly observed in the fall and winter (Horse Heaven Windfarm, LLC 2021a).

Snow goose (*Anser caerulescens*) was the most common large bird species observed overall (12.96 observations per 800-meter [2,625-foot] plot per 60-minute survey) and the species most commonly observed in the eastern portion of the Lease Boundary. Snow geese were most frequently observed during the winter. Sandhill crane (*Antigone canadensis*) was the most frequently observed large bird species in the western portion of the Lease Boundary and was most frequently documented during the fall.

Thirteen species of raptor were recorded in the Lease Boundary, with the northern harrier (*Circus hudsonius*) most frequently observed and occurring most often in the fall. Golden eagle (*Aquila chrysaetos*) and bald eagle (*Haliaeetus leucocephalus*) have been recorded in the Lease Boundary. All bald eagle observations were recorded in the winter and spring.

Thirteen special status bird species were recorded in the Lease Boundary and are discussed below. One species, peregrine falcon (*Falco peregrinus*), is listed as a species of greatest conservation need under the SWAP (WDFW 2015), but is not considered a special status species based on the definition provided below. Eleven special status species were recorded on the western side of the Lease Boundary, and eight in the eastern portion. Raptor nest surveys were completed by the Applicant from 2017 to 2019 and recorded 44 nests within 2 miles (3.2 kilometers) of the Lease Boundary. Nesting habitat includes trees and areas along cliffs and rock outcrops.

Surveys conducted in 2017 documented 21 nests within 10 miles of the Lease Boundary, including 10 occupied nests within 2 miles of the Lease Boundary: two ferruginous hawk (*Buteo regalis*), four red-tailed hawk (*Buteo jamaicensis*), two great horned owl (*Bubo virginianus*), one Swainson's hawk (*Buteo swainsoni*), and one common raven (*Corvus corax*).

A survey conducted in 2018 documented 36 nests within 10 miles of the Lease Boundary, 24 of which were occupied. Occupied nests recorded within 2 miles of the Lease Boundary included eight red-tailed hawk, six Swainson's hawk, three great horned owl, and one ferruginous hawk. Active bald eagle nests were reported beyond 2 miles of the Lease Boundary.

Surveys conducted in 2019 for the Four Mile Wind Project recorded 13 occupied nests, including five red-tailed hawk, two Swainson's hawk, two common raven, and one ferruginous hawk within 2 miles of the Lease Boundary. Three of the nests (two raven and one Swainson's hawk) were located within the Lease Boundary. Six occupied bald eagle nests were recorded between 2 and 10 miles from the Lease Boundary. Surveys conducted for the Badger Canyon Project documented 13 occupied nests, including five Swainson's hawk, three red-tailed hawk, three common raven, and two great horned owl nests. Four of these nests are within the Lease Boundary. In addition, two active bald eagle nests were documented within 10 miles of the Lease Boundary. **Table 3.6-2** summarizes raptor stick nests recorded by the Application for Site Certification (ASC) (Horse Heaven Wind Farm, LLC 2021a).

Table 3.6-2: Raptor Stick Nest Survey Results[(a)]

Species[(b)]	2017	2018	2019
Common raven *(Corvus corax)*	1	1	5
Ferruginous hawk (*Buteo regalis*)	2	1	1
Great horned owl (*Bubo virginianus*)	2	2	3
Red-tailed hawk (*Buteo jamaicensis*)	4	8	14
Swainson's hawk (*Buteo swainsoni*)	1	6	7
Unoccupied	10	14	14
Total	**20**	**32**	**44**

Notes:
[(a)] Nests recorded within 2 miles of the Lease Boundary
[(b)] Nests were active during surveys except for those identified as "Unoccupied."

Mammals

Most of the habitat in the Lease Boundary has been historically modified by agricultural practices; however, it is expected that portions of the modified habitat and remnant patches of shrub and grassland habitat support small and medium-sized mammals. The Washington NatureMapping Program shows rodent (e.g., mice), insectivore (e.g., shrews), lagomorph (e.g., rabbits), and mustelid (e.g., weasel) species with ranges that overlap the Lease Boundary (NatureMapping n.d.). Medium and large carnivores are not expected to occur regionally, except for species adapted to modified habitat, such as coyotes (*Canis latrans*). Three species of ungulate—mule deer[8] (*Odocoileus hemionus*), white-tailed deer[9] (*O. virginianus*), and pronghorn antelope[10] (*Antilocapra americana*)—have ranges that overlap the Lease Boundary. The Applicant has reported observations of ground squirrels, coyotes, mule deer, and pronghorn antelope in the Lease Boundary.

Bats

Twelve bat species are reported to occur regionally (NatureMapping n.d.), and the Applicant reported observations of eight species of bats in the Lease Boundary during field base surveys:

- California myotis (bat) (*Myotis californicus*)
- Canyon bat (*Parastrellus hesperus*)
- Little brown bat (*Myotis lucifugus*)

[8] Habitat mapped as patches of core breeding habitat (NatureMapping n.d.)
[9] Habitat mapped as marginal habitat (NatureMapping n.d.)
[10] No predictive habitat mapping available (NatureMapping n.d.)

- Long-legged myotis (bat) (*Myotis volans*)
- Western long-eared bat (*Myotis evotis*)
- Big brown bat (*Eptesicus fuscus*)
- Hoary bat (*Lasiurus cinereus*)
- Silver-haired bat (*Lasionycteris noctivagans*)

Silver-haired bat was the most common species detected, followed by hoary bat and big brown bat. Silver-haired and hoary bats are listed as species of greatest conservation need under Washington's SWAP (WDFW 2015). Bat activity recorded in the Lease Boundary peaked in September.

Bats are expected to forage over the Lease Boundary during summer months and migrate over the area in spring and fall. Surveys for hibernacula have not been conducted; however, the Applicant reports that suitable hibernacula sites (e.g., farm outbuildings, caves) are not available in the Lease Boundary. No bat hibernacula, bat concentration areas, cliffs, caves, or talus have been reported in Priority Habitats and Species (PHS) data within 3 miles of the Four Mile Wind Project area and Badger Canyon Wind Project area (Horse Heaven Wind Farm, LLC 2021a). Most bat species recorded during the multi-year acoustic studies conducted in the Lease Boundary are migratory species that would not overwinter in the Lease Boundary.

Migration Routes and Habitat Connectivity

The Project would be located along the Pacific flyway bird migration route. The Pacific flyway extends from Alaska to Patagonia and connects summer and winter grounds along the western portion of the continent. In Washington State, the Pacific flyway extends from the Pacific Ocean to the Rocky Mountain Range. The Applicant reports that cropland, shrubland, and grassland in the Lease Boundary provide suitable stopover habitat for raptors, songbirds, waterfowl, and shorebirds.

Bat migratory routes are poorly understood; however, bat acoustic data collected by the Applicant suggest that bats migrate over the Lease Boundary during spring and fall. Silver-haired bat and hoary bat were the two species most frequently detected during acoustic surveys. Silver-haired bats are recorded in Washington State from April through November, while hoary bats are typically recorded in Washington State from June through October (Cryan 2003).

Disturbance associated with the Project would not overlap big game migration routes (Horse Heaven Wind Farm, LLC 2021a), although the Lease Boundary overlaps areas modeled as wildlife movement corridors (WHCWG 2013). The Washington Wildlife Habitat Connectivity Working Group (WHCWG) developed a statewide habitat connectivity tool that models potential wildlife movement corridors in the landscape. Corridors were modeled based on an aggregate of habitat data for selected focal species. The model considers parameters such as habitat (e.g., habitat concentration area), landscape integrity (e.g., areas with limited human impact), and existing barriers to wildlife movement. These factors were considered to rate areas that facilitate wildlife movement. These areas are rated as very high (areas characterized as low-cost for wildlife movement) to low (areas characterized as a high-cost for wildlife movement) by WHCWG (2013). One modeled movement corridor rated as Medium to High runs in an east-west orientation along the northern perimeter of the Lease Boundary (shown in yellow and orange in **Figure 3.6-2**), and another rated as Medium to High runs in a north-south orientation parallel to Highway 395 (shown in yellow and orange in **Figure 3.6-2**). The north-south corridor connects the Hanford Site and Rattlesnake Hills to a habitat concentration area (HCA) in Oregon.

This Page Intentionally Left Blank

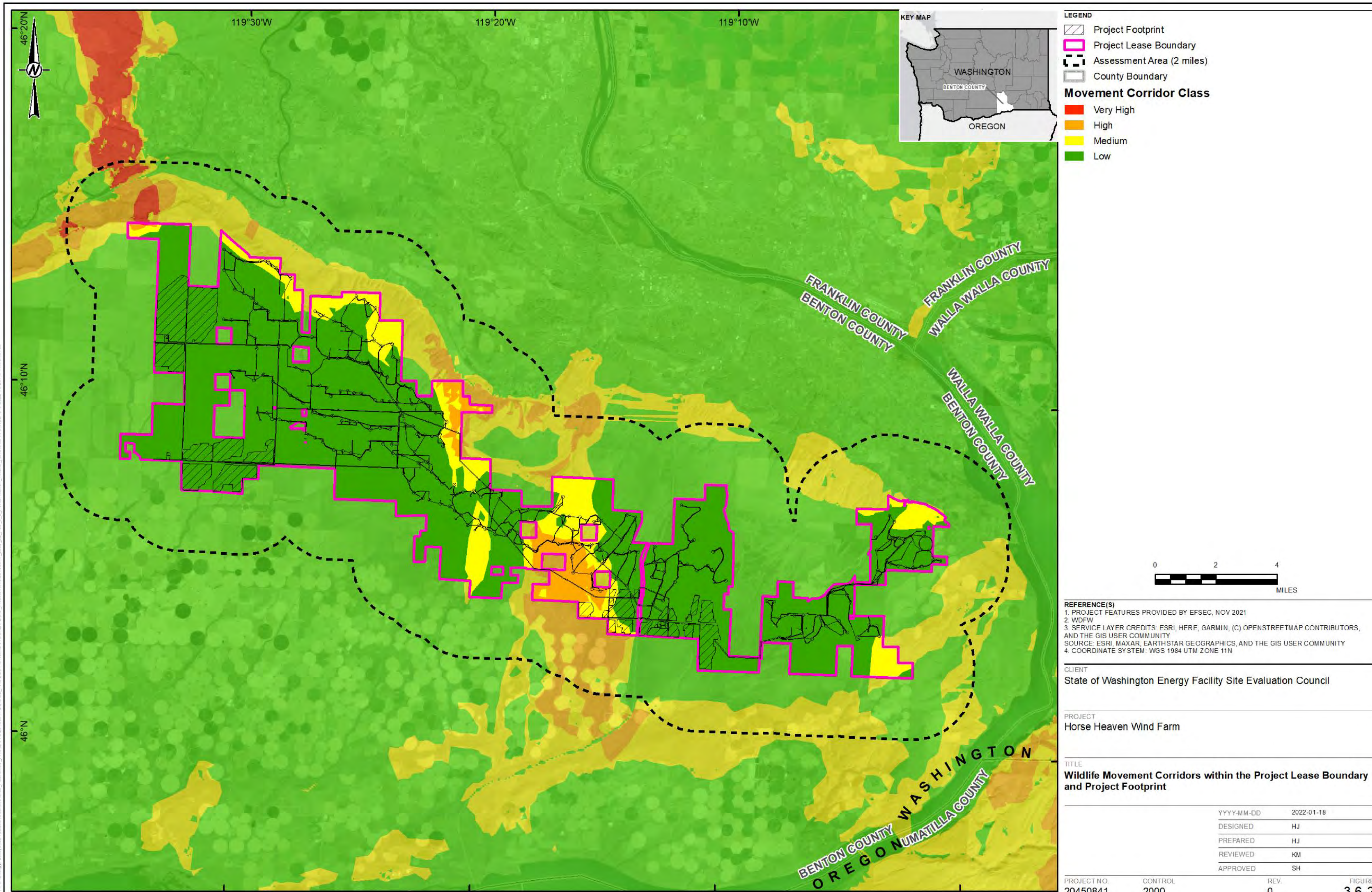


Figure 3.6-2: Wildlife Movement Corridors within the Project Lease Boundary and Project Footprint

Special Status Wildlife Species

For the purpose of this Draft EIS, the definition of "special status wildlife species" is consistent with the definition provided in the ASC—i.e., that special status wildlife species are one or more of the following:

- Listed under the federal Endangered Species Act
- Listed by Washington State as endangered, threatened, sensitive, or candidate species
- Listed by WDFW as priority species[11]
- An eagle species

In addition to species classified as special status using the definition above, this section also discusses pronghorn antelope, which is understood to be of specific importance to the Yakama Nation and is part of a regional re-introduction program. While discussed in this section, pronghorn antelope is not considered a special status species.

The Applicant has identified 20 special status species with potential to occur in the Lease Boundary. No species listed, or candidates for listing, under the federal Endangered Species Act are predicted to occur in the Lease Boundary. Data on special status species presence were collected from background resources (e.g., WDFW PHS data) and field-based data collected by the Applicant. It is noted that data collected and maintained by WDFW may not include private property; therefore, the lack of PHS data on species presence does not indicate species' absence. **Table 3.6-3** summarizes the 20 special status species with potential to occur within the Lease Boundary; each special status species is described in the text following **Table 3.6-3**.

[11] WDFW defines Washington priority species as those species "that are State listed as Endangered, Threatened, Sensitive, and Candidate Species; vulnerable animal groups; and vulnerable species of recreational, commercial, or tribal importance." (WDFW 2022)

Table 3.6-3: Summary of Special Status Species with Potential to Occur in the Project Lease Boundary

Species	Habitat	Abundance	Abundance in Washington State[1]	Short-term Trends	Long-term Trends	Threats
Sagebrush lizard *Sceloporus graciosus*	▪ Shrublands ▪ Grasslands ▪ Deserts ▪ Open coniferous forests ▪ Sand dunes	100,000 Individuals (globally)	NA	Stable or declining	Unknown	▪ Habitat loss ▪ Fragmentation of habitat ▪ Degradation from non-native plant
Striped whipsnake *Coluber taeniatus*	▪ Shrub-steppe ▪ Hibernacula sites in basalt outcrops	>100,000 Individuals (globally)	NA	Stable or declining	Variable	▪ Habitat loss ▪ Road mortality
American white pelican *Pelecanus erythrorhynchos*	▪ Islands in freshwater ▪ Migration inland, along rivers	>100,000 Individuals, (globally)	NA	Increasing	Declining	▪ Human encroachment on breeding sites ▪ Degradation of aquatic foraging habitat ▪ Pesticide use
Bald eagle *Haliaeetus leucocephalus*	▪ Proximity to foraging habitat (large fresh water and marine systems)	100,000 Individuals (North America)	3,000 to 4,000 Individuals	Stable or increasing	Stable or declining	▪ Disturbance ▪ Habitat loss ▪ Biocide contamination ▪ Food supply ▪ Illegal hunting
Burrowing owl *Athene cunicularia*	▪ Open grassland ▪ Steppe ▪ Desert	>100,000 Individuals (globally)	NA	Declining	Declining	▪ Decline in denning locations ▪ Habitat loss

Table 3.6-3: Summary of Special Status Species with Potential to Occur in the Project Lease Boundary

Species	Habitat	Abundance	Abundance in Washington State[1]	Short-term Trends	Long-term Trends	Threats
Ferruginous hawk *Buteo regalis*	▪ Grassland ▪ Sagebrush ▪ Canyons	<83,000 Individuals (U.S.)	NA	Declining	Declining	▪ Mortalities from collisions with wind turbines, transmission lines roads and highways ▪ Habitat loss ▪ Reduction of prey abundance ▪ Pesticides/contaminants ▪ Climate change ▪ Nest disturbance
Golden eagle *Aquila chrysaetos*	▪ Shrubland ▪ Grassland	<100,000 Individuals (North America)	NA	Stable to declining	stable	▪ Mortality from collisions with powerlines and wind turbines ▪ Consumption of poisons ▪ Habitat degradation ▪ Disturbance of nest sites
Great blue heron *Ardea herodias*	▪ Lakeshore, coastal water, streams ▪ Pasture, fields, fallow areas	124,500 (*Herodias* subspecies North America)	NA	Stable to increasing	Stable to increasing	▪ Contamination of food sources ▪ Alteration of foraging habitat ▪ Disturbance of nesting sites
Loggerhead shrike *Lanius ludovicianus*	▪ Shrubland ▪ Grassland	6,000,000 Individuals (globally)	NA	Declining	Declining	▪ Pesticide use ▪ Decline in food availability ▪ Loss and degradation of breeding habitat

Table 3.6-3: Summary of Special Status Species with Potential to Occur in the Project Lease Boundary

Species	Habitat	Abundance	Abundance in Washington State[1]	Short-term Trends	Long-term Trends	Threats
Prairie falcon *Falco mexicanus*	▪ Arid environments ▪ Coastal (overwinter)	<9,000 Individuals (North America)	200 Individuals	Stable	NA	▪ Disturbance ▪ Habitat loss and degradation ▪ Collisions with infrastructure
Ring-necked pheasant *Phasianus colchicus*	▪ Open environments ▪ Coastal areas	NA	NA	Stable	Declining	▪ Hunting ▪ Food contamination ▪ Mortality from collision with machinery ▪ Habitat degradation
Sagebrush sparrow *Artemisiospiza nevadensis*	▪ Sagebrush ▪ Bunch grass shrub-steppe	NA	NA	Stable to declining	Stable to declining	▪ Habitat loss and degradation ▪ Changes in fire regimes
Sage thrasher *Oreoscoptes montanus*	▪ Shrub-steppe	>1,000,000 Individuals (globally)	NA	Declining	Declining	▪ Habitat loss and degradation
Sandhill crane *Antigone canadensis*	▪ Sunnyside-Snake River Wildlife Area ▪ Marsh, wetland, and bog habitat ▪ Wet meadows ▪ Grain fields	8,000 Individuals (Central Valley population)	8,000 Individuals (Central Valley population)	Stable	NA	▪ Habitat loss ▪ Collisions with infrastructure ▪ Nest predation
Tundra swan *Cygnus columbianus*	▪ Freshwater system ▪ Marine systems ▪ Fields	<170,000 Individuals (North America)	NA	Stable	NA	▪ Hunting on winter grounds ▪ Consumption of spent lead shots and fishing leads

Table 3.6-3: Summary of Special Status Species with Potential to Occur in the Project Lease Boundary

Species	Habitat	Abundance	Abundance in Washington State[1]	Short-term Trends	Long-term Trends	Threats
Vaux's swift *Chaetura vauxi*	▪ Access to roost sites (trees, snags, chimneys)	<300,000 Individuals (North America)	NA	Declining	Declining	▪ Loss of old trees and snags ▪ Change in chimney availability ▪ Pesticides
Townsend's big-eared bat *Corynorhinus townsendii*	▪ Coniferous forests ▪ Riparian habitat ▪ Shrub-steppe ▪ Open fields	<100,000 Individuals (globally)	NA	Stable to declining	Declining	▪ Disturbance and destruction of hibernacula and maternity colonies ▪ Loss of roosting and foraging habitat
Townsend's ground squirrel *Urocitellus townsendii*	▪ Shrub-steppe ▪ Grasslands ▪ Pastures ▪ Orchards ▪ Highway margin, and canal banks	NA	NA	Stable to Declining	Declining	▪ Habitat loss and degradation
Black-tailed jackrabbit *Lepus californicus*	▪ Sagebrush ▪ Rabbitbrush ▪ Grassland	NA	NA	Declining	Stable	▪ Habitat loss ▪ Mortality from persecution ▪ Disease
White-tailed jackrabbit *Lepus townsendii*	▪ Open bunchgrass habitat ▪ Sagebrush	<1,000,000 Individuals (globally)	NA	NA	NA	▪ Loss and degradation of habitat
Pronghorn antelope *Antilocapra americana*	▪ Grassland ▪ Shrubland	NA	<300 Individuals	Increasing	NA	▪ Previously extirpated from Washington State

Notes:
Source: Citations for sources of information provided under species-specific sections
NA = Not available

Sagebrush Lizard

Sagebrush lizard (*Sceloporus graciosus*) occurs across the arid areas of the central western United States, extending northward into Washington State. In Washington State, the species occurs in semi-desert and steppe areas throughout the Columbia Basin, including Benton County (NatureMapping n.d.). The species is associated with shrublands, grasslands, deserts, open coniferous forests, and sand dunes where open ground with low-lying shrubs is available. Suitable habitat generally has limited grass and leaf cover. The species has a small home range size of approximately 1.2 acres (0.5 hectares) (NatureServe 2021).

Local population estimates and trends are not available; however, NatureServe (2021) estimates the global population to be approximately 100,000 individuals. Short-term trends may be stable or decreasing, and long-term trends are unknown (WDFW 2021b). Threats to the species include habitat loss and fragmentation (e.g., roadways), as well as habitat degradation from non-native plant species, such as cheatgrass, and loss of sagebrush (WDFW 2021b). The species is a candidate for state listing and is a state priority species.

Shrubland, including sagebrush and rabbitbrush habitat, within the Lease Boundary is expected to provide suitable habitat for this species. Washington's NatureMapping Program reports suitable core sagebrush lizard habitat along the northern and southern perimeter of the Lease Boundary (NatureMapping n.d.). Sagebrush lizard has not been documented within the Lease Boundary, though species-specific surveys have not been conducted (WDFW 2021c; Horse Heaven Wind Farm, LLC 2021a).

Striped Whipsnake

Striped whipsnake (*Coluber taeniatus*) occurs across the western and southwestern United States, from Washington State south to California and east to Texas. The desert striped whipsnake subspecies (*C. t. taenatus*) occur in Washington State, where it is verified as occurring in two locations in Grant County (WDFW 2021d). The species is a shrub-steppe obligate, occurring in areas where it can access suitable hibernacula sites in basalt outcrops (WDFW 2021d). Movements between hibernacula and summer range are estimated to average 2,950 feet (900 meters) for females and 4,920 feet (1,500 meters) for males (NatureServe 2021).

Local population estimates and trends are not available; however, NatureServe (2021) estimates that the global population exceeds 100,000 individuals. Population trends are expected to be variable across the species' range and are broadly considered to be stable or declining globally (NatureServe 2021). Striped whipsnake has likely always been uncommon in Washington State, which is at the northern end of its range. Striped whipsnake is a candidate for listing in Washington State and is a state priority species in Washington State due to conversion of shrub-steppe habitat to agricultural or land development purposes and destruction of hibernacula sites (WNHP et al. 2009).

Striped whipsnake has historically been recorded in Benton County, and core habitat occurs along the northern perimeter of the Lease Boundary (NatureMapping n.d.). It is expected that shrub-steppe habitat in the Lease Boundary provides suitable summer habitat for the species; however, the Applicant reports that the area does not contain basalt outcrops, which are required for hibernacula. While the species has historically been reported in Benton County, PHS data do not report occurrences of the species within 2 miles (3.2 kilometers) of the Lease Boundary **(Figure 3.6-3**), and striped whipsnake was not recorded within the Lease Boundary during field surveys, though species-specific surveys have not been conducted (Horse Heaven Wind Farm, LLC 2021a; WDFW 2021d).

American White Pelican

American white pelicans (*Pelecanus erythrorhynchos*) occur across most of North America, breeding in Canada, the north-central United States, and western United States and overwintering in the southern United States and Central America. In Washington State, American white pelicans breed on Badger Island in the Columbia River (WDFW 2021e) and migrate over the eastern portion of the state (Knopf and Evans 2020). Breeding occurs on islands in freshwater systems protected from humans and predation (WDFW 2021e). Migration occurs inland, often along rivers, with access to aquatic stopover areas (Knopf and Evans 2020).

Local population estimates and trends are not available; however, NatureServe (2021) estimates that the global population exceeds 100,000 individuals. WDFW (2015) reports that approximately 1,000 pairs of American white pelican breed at Badger Island in the Columbia River. American white pelicans have undergone historical population declines, but populations appear to have increased since 1980 (Knopf and Evans 2020). The species is vulnerable to human encroachment on breeding sites, changes and degradation of aquatic foraging habitat, pesticide use, and continues to exhibit effects from hunting in the past (Knopf and Evans 2020). The species is state listed as sensitive and is a state priority species.

Suitable nesting and foraging habitat does not occur within the Lease Boundary; however, American white pelicans were recorded during field surveys flying over the Lease Boundary when moving to and from the Badger Island breeding colony and during migration. The Badger Island breeding colony is located approximately 4 miles (6.5 kilometers) east of the Lease Boundary and is one of the largest breeding colonies in the United States. The Applicant recorded 887 birds (76 groups) flying over the Lease Boundary during field surveys (Horse Heaven Wind Farm, LLC 2021a). Most of the observations were recorded during the summer (724 individuals) followed by fall (111 individuals) and spring (52 individuals).

Bald Eagle

Bald eagles occur across most of North America and breed in Canada, the western and southeastern United States, and patches of central and east coastal United States and are year-round residents in most of Washington State. Breeding typically occurs in trees within 1.2 miles of water, although breeding locations and substrate can vary. Bald eagles may congregate outside of the breeding period in areas with access to foraging habitat (e.g., large rivers) and roosting sites (Buehler 2020).

Local population estimates and trends are not available; however, Buehler (2020) reports that the North American population may be as high as 100,000 individuals, and WDFW (2015) reports that approximately 3000 to 4000 individuals occur in Washington State. Bald eagle populations have increased since 1972 due to bans of dichlorodiphenyltrichloroethane (DDT), and populations in Washington State may be approaching carrying capacity (Buehler 2020). Threats to bald eagle include disturbance, habitat loss, biocide contamination, food supply, and illegal hunting (NatureServe 2021). Bald eagle is a state priority species and is protected under the federal Bald and Golden Eagle Protection Act.

Bald eagles are year-round residents in Benton County and nest along the Columbia River (Horse Heaven Wind Farm, LLC 2021a). Bald eagles were observed flying over the Lease Boundary during field surveys, including six observations over the western portion of the Lease Boundary and 10 over the eastern portion of the Lease Boundary. In the west, the observations were grouped around Bing and Coyote Canyons. Bald eagles were observed predominantly in the winter and spring months (Horse Heaven Wind Farm, LLC 2021a). Seven bald eagle nests were recorded during field surveys, none of which were within the Lease Boundary (**Table 3.6-4**).

Table 3.6-4: Bald Eagle Nests Recorded within 10 Miles of the Lease Boundary

Nest Location	Nest Status[(a)]	Distance to Nearest Proposed Turbine (miles)
Prosser	Active 2019	10.7
Yakima River Mouth	Active 2017 Active 2018 Inactive 2019	8.1
Port of Pasco	Active 2019	6.5
Peavine island	Active 2019	3.7
McNary NWR	Active 2019	7.8
Sand Station	Active 2019	9.2

Source: Horse Heaven Wind Farm, LLC 2021a
Notes:
(a) Only includes years the nest location was surveyed
NWR = National Wildlife Refuge

Burrowing Owl

Burrowing owls (*Athene cunicularia*) occur across central and southern United States. In Washington State, burrowing owl breeding habitat occurs in arid areas in the southern-central part of the state. Benton County is located in the center of the mapped core habitat for this species in Washington State (NatureMapping n.d.). Suitable breeding habitat includes open grassland, steppe, and desert ecosystems, where the species typically occurs in gently sloped areas with sparse vegetation (Poulin et al. 2020). Burrowing owls can occur in anthropogenically modified landscapes such as agricultural fields, and roadway rights-of-way. Abandoned mammal burrows are used for nesting and are an important feature in suitable habitat.

National and regional populations are poorly understood, and likely vary across the species' range. In Washington State, populations are estimated to have declined by approximately 1.5 percent annually between 1968 and 2005 (Poulin et al. 2020). The species is considered uncommon outside of Benton, Franklin, Grant, and Adams Counties (WDFW 2021f). Risks to burrowing owls in Washington State are understood to include decline in small mammals, resulting in a reduction of denning locations and loss of habitat from alteration of landscape to agriculture and developed areas (WDFW 2021f). Burrowing owl is a candidate species for state listing and is a state priority species.

The Lease Boundary is classified as core habitat for burrowing owls, and PHS data report 32 burrowing owl nests or burrows within 2 miles of the Lease Boundary (**Figure 3.6-3**), including four within the Lease Boundary (NatureMapping n.d.). Suitable habitat for burrowing owls may exist in grasslands, shrublands, and fallow agricultural fields, and along roadways. Burrowing owls were not recorded in the Lease Boundary during the field surveys conducted by the Applicant; however, species-specific surveys were not conducted.

Ferruginous Hawk

Ferruginous hawk range extends across open portions of western North America, extending into southeastern Washington State. Benton County is located in core habitat for this species in Washington State and, along with Franklin County, supports the majority of nesting territories (Hayes and Watson 2021; NatureMapping n.d.). Habitat generally consists of grassland and sagebrush ecosystems, as well as canyons with cliffs and rock outcrops that provide nesting sites (Ng et al. 2020). In Washington State, nests are typically placed at lower elevations and heights less than 33 feet (10 meters) (Ng et al. 2020). Preferred nesting locations include rock outcrops and juniper trees with southern and western exposures (Ng et al. 2020). Additionally, nesting sites require access to prey sources that include small mammals, such as ground squirrels. Ferruginous hawk core habitat is estimated to extend 2 miles (3.2 kilometers) from the nest site, and the home range is estimated to encompass approximately 6 miles (10 kilometers) from the nest site (Ritter 2022; Watson 2022a). These distances were derived from telemetry data collected in south-central and north-central Washington State (Watson 2022a).

Ng et al. (2020) report that the North American population was estimated to be approximately 5,842 to 11,330 individuals in the early 1990s. More recent estimates, based on breeding bird surveys, estimated the North American population to be upwards of approximately 83,000 individuals, but within Washington State, the species has been in decline. Statewide ferruginous hawk territory occupancy trends are presented in Hayes and Watson (2021), who report that the breeding population in Washington State has shown sustained declines: “Between 1974 and 2016, there have been significant declines in nesting territory occupancy, nest success, and productivity.” Specific to Benton County, which is part of the Washington State core breeding range for this species, Hayes and Watson (2021) report substantial declines in the percentage of nesting territories supporting breeding pairs.

Threats to ferruginous hawk include mortalities from collisions with wind turbines, transmission lines, roads and highways, loss of foraging habitat as native habitats are converted to agricultural land or developed, reduction of prey abundance, indirect mortality from pesticides/contaminants, climate change, and nest disturbance (Ng 2020; Hayes and Watson 2021). Ferruginous hawks are state listed as endangered and are a state priority species, partially due to the continued contraction in breeding pairs statewide, as well as the lack of improvement in habitat conditions and primary threats to the species.

Shrub-steppe and grassland habitat in the Lease Boundary where small mammals occur may provide suitable ferruginous hawk foraging habitat, while canyons provide suitable nesting substrate. Portions of the Lease Boundary are classified as core habitat for ferruginous hawk (NatureMapping n.d.). PHS data show 41 ferruginous hawk nests within 2 miles of the Lease Boundary, including 10 within the Lease Boundary. Known ferruginous hawk nest locations (both active and inactive) are generally concentrated northwest of the Lease Boundary, between Interstate 82 and the northwestern edge of the Lease Boundary, near mapped ground squirrel concentration areas. Three nest sites are recorded along the southern edge of the Lease Boundary, and east of Interstate 82.

The Applicant reported that nine ferruginous hawk nests, documented during surveys conducted between 2017 and 2019, occur within 2 miles of the proposed turbine locations, including two that were occupied at least once during the study period (Horse Heaven Wind Farm, LLC 2021a). Nests were predominantly recorded along canyons, including Webber, Sheep, and Badger Canyon (Horse Heaven Wind Farm, LLC 2021a). It is understood that the area may represent up to 16 historical territories (Ritter 2022; Watson 2022b). Ferruginous hawk observations were recorded four times during point count surveys near the nest with activity recorded during field surveys.

Golden Eagle

Golden eagle (*Aquila chrysaetos*) range extends across North America. In Washington State, core breeding habitat is generally in arid environments located in the central portion of the state. Suitable habitat is variable but includes shrubland and grassland. Nesting may occur in trees or on cliffs.

North American populations are estimated at up to 100,000 individuals, with approximately 190 breeding pairs in Washington State (Katzner et al. 2020). Western North American populations appear to be stable or in slight decline. Historically, golden eagles were threatened by eradication campaigns; current threats include mortality from collisions with powerlines and wind turbines; consumption of poisons (e.g., rodenticide); habitat change, including reduction of prey items; and disturbance of nest sites (Katzner et al. 2020). Golden eagle is a candidate species for state listing, a state priority species, and protected under the Bald and Golden Eagle Protection Act.

Open grassland, shrubland, and agricultural areas in the Lease Boundary provide suitable foraging habitat for golden eagles. Six golden eagles were recorded in the western portion of the Lease Boundary, and one was documented in the east during field surveys conducted by the Applicant (Horse Heaven Wind Farm, LLC 2021a). Most observations were documented during the fall. No golden eagle nests were recorded in or within 10 miles of the Lease Boundary, though suitable nesting habitat is available along cliffs associated with the Columbia River (Horse Heaven Wind Farm, LLC 2021a).

Great Blue Heron

Great blue heron (*Ardea herodias*) range extends across most of North America and Central America. In Washington State, the species' breeding range generally extends along the coast and the central-eastern part of the state, with the *herodias* subspecies occurring in eastern Washington. Great blue heron is adaptable and uses a variety of habitat for foraging, including aquatic (e.g., lakeshore, coastal water, streams) and upland (e.g., pasture, fields, fallow areas) areas (Vennesland and Butler 2020). Nesting occurs in trees, in bushes, on the ground, or on artificial structures, typically near water (Vennesland and Butler 2020).

The *herodias* subspecies population is estimated at 124,500 individuals, although local population estimates are not available (Vennesland and Butler 2020). Long- and short-term trends suggest that great blue heron populations are stable or increasing; however, the populations were historically impacted by hunting (NatureServe 2021). Threats to the species include contamination of food sources, alteration of foraging habitat (e.g., draining wetlands), and disturbance of nesting sites. Great blue heron is a state priority species.

The Lease Boundary is not expected to provide suitable nesting habitat for great blue heron; however, grassland, agricultural fields, and shrubland may provide foraging habitat (Horse Heaven Wind Farm, LLC 2021a). Nesting may occur along adjacent watercourses, such as the Yakima River (Horse Heaven Wind Farm, LLC 2021a). The Lease Boundary overlaps areas of core breeding habitat (NatureMapping n.d.). One great blue heron was recorded flying over grassland area of the Lease Boundary during the winter (Horse Heaven Wind Farm, LLC 2021a).

Loggerhead Shrike

Loggerhead shrike (*Lanius ludovicianus*) range extends across most of the United States, including portions of southern Canada. In Washington State, core breeding habitat for loggerhead shrike is predominantly located in the central portion of the state along the Columbia Basin (NatureMapping n.d.). Breeding habitat generally consists of undisturbed patches of shrub-steppe and grass areas, although abundance appears to be correlated with active pasture lands in portions of the species' range, suggesting that access to perches and short grass may be important (Yosef 2020). Loggerhead shrike is a candidate for state listing and is a state priority species.

The global population of loggerhead shrike is estimated to be six million individuals; however, local population estimates are not available (NatureServe 2021). Species declines have been noted in most states, and current population decreases are estimated at 3.5 to 5 percent per year. Threats to the species include pesticide use, decline in food (e.g., invertebrate) availability, and loss and degradation of breeding habitat through loss of sagebrush steppe habitat (NatureServe 2021; Yosef 2020).

Shrubland, abandoned homesteads, and hedgerows in the Lease Boundary provide suitable nesting habitat for loggerhead shrike (Horse Heaven Wind Farm, LLC 2021a). Shrubland and agricultural fields provide foraging habitat for the species (Horse Heaven Wind Farm, LLC 2021a). The Lease Boundary overlaps core loggerhead shrike breeding habitat. PHS data report seven loggerhead shrike occurrences within 2 miles of the Lease Boundary (**Figure 3.6-3**), three of which are nest sites. Five of the loggerhead shrike occurrences are reported from within the Lease Boundary, two of which are nest locations. A loggerhead shrike nest was recorded within the Lease Boundary in 1990, and a second was recorded approximately 350 feet from the Lease Boundary (Horse Heaven Wind Farm, LLC 2021a). One loggerhead shrike was recorded during summer field surveys in the eastern portion of the Lease Boundary (Horse Heaven Wind Farm, LLC 2021a). The Applicant reports that this bird may have been nesting when observed (Horse Heaven Wind Farm, LLC 2021a).

Prairie Falcon

Prairie falcon (*Falco mexicanus*) range extends across most of western United States and northern Mexico. In Washington State, the species is a year-round resident in the central and eastern portions of the state and may overwinter in coastal areas (Steenhof 2020). Core breeding habitat has been identified in central Washington State (NatureMapping n.d.). PHS data report 12 occurrences of prairie falcon within 2 miles of the Lease Boundary (**Figure 3.6-3**), though none within the Lease Boundary. Prairie falcon habitat consists of arid open environments, including steppe, with cliffs, bluffs, and canyons that provide nesting sites (Steenhof 2020). Access to prey species, including horned lark, meadowlark (*Sturnella neglecta*), and ground squirrel, is an important component of prairie falcon habitat (Steenhof 2020).

The breeding population of prairie falcon in North America is estimated at 8,546 individuals, while the population in Washington State was estimated at 200 individuals (circa 1971) (Steenhof 2020). Lack of long-term population data has resulted in imprecise population trends; however, Steenhof (2020) reports that populations in western North America may be declining. Prairie falcon is a state priority species.

In the Lease Boundary, suitable prairie falcon nesting habitat occurs on bluffs and canyons, and foraging habitat occurs in shrubland and grassland habitat (Horse Heaven Wind Farm, LLC 2021a). The Lease Boundary may overlap core breeding habitat (NatureMapping n.d.), although the central Columbia Basin, which includes Benton County, supports the largest wintering population of prairie falcon in Washington State (Horse Heaven Wind Farm, LLC 2021a). Prairie falcons (30 observations) were recorded in cropland and grassland within the Lease Boundary during all seasons, though observations were reported to be lower in spring and summer (Horse Heaven Wind Farm, LLC 2021a).

Ring-necked Pheasant

Ring-necked pheasant (*Phasianus colchicus*) is an introduced gamebird that originates from Asia. The species now occupies habitat across most of northern and central United States and southern Canada. In Washington State, core breeding habitat includes most open habitats in eastern Washington, as well as coastal areas. The species is adaptable and occupies a variety of habitat types although generally requires areas with cover, such as dried grasses, for nesting and roosting, roosting perch sites (e.g., trees or shrubs), and crowing areas.

Reliable population estimates are not available for North America and estimates are often variable. Harvest data maintained by WDFW suggest that ring-necked pheasant populations have declined since the early 1980s (WDFW 2021g). In Washington State, WDFW releases pen-raised ring-necked pheasants to supplement wild populations (WDFW 2021h). Local and national population trends are not known, as reliable population data are not available. Giudice and Ratti (2020) report declines in the Rocky Mountain states; however, it is expected that populations are stable given state management of the species. Ring-necked pheasants are hunted, and hunting pressures represent a primary threat to populations. Additional threats may include contamination of food sources from insecticides, mortality from agricultural machinery and road vehicles, and degradation of habitat from increased industrial farming (Giudice and Ratti 2020). Ring-necked pheasant is a state priority species.

Benton County is within a pheasant management zone, and agricultural and grassland habitat in the Lease Boundary is expected to provide habitat for ring-necked pheasant (Horse Heaven Wind Farm, LLC 2021a). Ten observations of ring-necked pheasant were recorded during field surveys, primarily in cropland and grassland (Horse Heaven Wind Farm, LLC 2021a). PHS data report 10 occurrences of ring-necked pheasants within 2 miles of the Lease Boundary (**Figure 3.6-3**).

Sagebrush Sparrow

Sagebrush sparrow (*Artemisiospiza nevadensis*) range consists of western states from Washington to northern Mexico, where the species is associated with shrub-steppe habitat. In Washington State, it occurs primarily in the sagebrush and bunch grass shrub-steppe ecosystems of the Columbia Basin. Sagebrush sparrows are associated with semi-open habitat with evenly spaced shrubs, and with sagebrush (Martin and Carlson 2020).

Regional population estimates are not available for sagebrush sparrows, although, WDFW (2021i) reports that populations in Washington State are stable. Martin and Carlson (2020) report that breeding bird survey data suggest declines of 1 to 2 percent in western states, including Washington State. Threats to the species are primarily reported to be from habitat loss and degradation. Changes in fire regimes (e.g., suppression and increased frequency of high intensity fires) have changed patterns of plant succession and composition (Martin and Carlson 2020). The species is a candidate for listing in Washington State and is a state priority species.

Sagebrush habitat in the Lease Boundary provides suitable breeding and living habitat for sagebrush sparrow. The Lease Boundary overlaps limited core breeding habitat (NatureMapping n.d.). One sagebrush sparrow was recorded during spring 2018 field-based surveys (Horse Heaven Wind Farm, LLC 2021a). PHS data report one occurrence of sagebrush sparrow within 2 miles of the Lease Boundary (**Figure 3.6-3**).

Sage Thrasher

Sage thrasher (*Oreoscoptes montanus*) breeding range includes the western United States, extending into southern Canada, while winter range includes the southern states and northern Mexico. In Washington State, the species' core breeding range extends along the Columbia Basin to Okanogan County (NatureMapping n.d.). Sage thrashers require shrub-steppe habitat in their breeding range, generally using expansive areas of sagebrush, although they may use smaller fragments in agricultural areas (WDFW 2021j).

Washington population estimates are not available but are considered stable (Reynolds et al. 2020; WDFW 2021j). Density estimates for Washington counties published by Dobler et al. (1996, as reported by Reynolds et al. 2020) were 0.204 and 0.212 birds per hectare, while Stephens (1985, as reported by Reynolds et al. 2020) reported densities of 0.725 birds per hectare. Degradation and loss of habitat are considered the primary threat to sage thrashers. Sage thrasher is a candidate species for state listing and is a state priority species.

Shrub-steppe habitat in the Lease Boundary provides suitable breeding habitat for sage thrashers, and the Lease Boundary overlaps core breeding habitat (NatureMapping n.d.). Three occurrences of sage thrasher were recorded during field surveys—one during the spring and two during the fall (Horse Heaven Wind Farm, LLC

2021a). The individuals were using bushes and fences in grassland areas (Horse Heaven Wind Farm, LLC 2021a).

Sandhill Crane

Sandhill crane (*Antigone canadensis*) breeding range extends across most of the northern United States and Canada, with overwintering range in the southern United States. In Benton County, the Sunnyside-Snake River Wildlife Area provides an important stopover area for migrating sandhill cranes. Some nesting of greater sandhill cranes occurs in Yakima County. Breeding occurs in marsh, wetland, and bog habitat, as well as wet meadows (Gerber et al. 2020). Grain fields and aquatic habitat (shallow ponds, sloughs) are used during migration stopovers (Gerber et al. 2020).

The Central Valley population of sandhill crane, which winters in Central Valley, California, is estimated to be 8,000 individuals, while the Pacific flyway population is estimated at 25,000 individuals (Gerber et al. 2020). Over 35,000 sandhill cranes move along the Columbia Basin annually, making stopovers near Benton County (WDFW 2021k). Approximately 30 pairs of sandhill cranes breed in Washington State (WDFW 2015). In general, short-term trends show that sandhill crane populations appear stable (Gerber et al. 2020). Sandhill cranes are state listed as endangered and are a state priority species.

Transient birds could forage in agricultural fields, shrubland, and grassland habitat in the Lease Boundary; however, the Lease Boundary is not expected to provide nesting or substantial foraging habitat. Important stopover locations do occur in Benton County, though outside of the Lease Boundary. Sandhill crane was the most frequently observed large bird species over the western portion of the Lease Boundary (28 percent of large bird observations) (Horse Heaven Wind Farm, LLC 2021a). The Applicant reports 3,050 individuals in 27 groups moving over the Lease Boundary, predominantly in fall (Horse Heaven Wind Farm, LLC 2021a). No sandhill cranes were recorded perched or on the ground (Horse Heaven Wind Farm, LLC 2021a).

Tundra Swan

In North America, tundra swans (*Cygnus columbianus*) breed in northern Canada and Alaska and overwinter in patches of habitat in the western United States and the east coast. Overwintering habitat includes tidal and freshwater systems and agricultural fields (Limpert et al. 2020).

The North American population of tundra swan is estimated at 169,300 individuals. Western wintering swan populations appear to be decreasing at a rate of 2.3 percent per year (Limpert et al. 2020). Threats to tundra swan populations include hunting on winter grounds, as well as mortality due to consumption of spent lead shots and fishing leads (Limpert et al. 2020). Tundra swans are a state priority species.

Tundra swans may forage in agricultural areas in the Lease Boundary during migration stopovers. One group of 35 individuals was recorded flying over the Lease Boundary during spring surveys (Horse Heaven Wind Farm, LLC 2021a). This group had been incidentally observed in agricultural fields (Horse Heaven Wind Farm, LLC 2021a).

Vaux's Swift

Vaux's swift (*Chaetura vauxi*) range extends from the Yukon through the western United States to northern South America (Schwitters et al. 2021). In Washington State, breeding habitat is predominantly in the western and northeastern portion of the state (NatureMapping n.d.). Habitat used during migration includes access to roost locations that may include trees, snags, and industrial and residential chimneys (Schwitters et al. 2021).

The North American Vaux's swift population is estimated between 200,000 and 300,000 individuals (Schwitters et al. 2021); however, local population estimates are not available. Short-term trend estimates declines of 10 to 30 percent (NatureServe 2021), while long-term trends suggest that populations may have decreased by 50 percent from 1970 levels (Schwitters et al. 2021). Vaux's swift is a state priority species.

The Lease Boundary does not provide suitable nesting or roosting habitat for Vaux's swift; however, Vaux's swifts may migrate over the Lease Boundary. Large numbers of Vaux's swifts move through the Walla Walla River Important Bird Area, approximately 2 miles east of the Least Boundary (Horse Heaven Wind Farm, LLC 2021a). Vaux's swifts were not recorded during field surveys.

Townsend's Big-eared Bat

Townsend's big-eared bat (*Corynorhinus townsendii*) range extends across most of western and central United States into southern British Columbia (NatureServe 2021). Most of Washington State provides core habitat for the species, except along the coastal mountain range (NatureMapping n.d.). Habitat is variable and includes coniferous forests, riparian habitat, shrub-steppe, and open fields. Suitable habitat includes access to suitable maternity and hibernation sites, which include caves, mines, buildings, tunnels, and bridges (WDFW 2021m).

The global abundance is estimated between 10,000 and 1,000,000 individuals; however, local estimates are not available (NatureServe 2021). Long-term trends are estimated to be declines of 10 to 50 percent, while short-term trends may be stable or declining slightly (NatureServe 2021). Threats to the species include disturbance and destruction of hibernacula and maternity colonies, as well as timber harvesting that reduces suitable roosting and foraging habitat (NatureServe 2021). Townsend's big-eared bat is a candidate species for state listing and is a state priority species.

The Lease Boundary overlaps core habitat (NatureMapping n.d.); however, the area lacks microhabitat features, such as roosting or hibernacula sites (Horse Heaven Wind Farm, LLC 2021a). Townsend's big-eared bats were not recorded during acoustic bat surveys conducted in the Lease Boundary (Horse Heaven Wind Farm, LLC 2021a)

Townsend's Ground Squirrel

Townsend's ground squirrel (*Urocitellus townsendii townsendii*) range is limited to southeastern Washington State, south of the Yakima River, west and north of the Columbia River in Benton, Yakima, and Kittitas Counties (NatureServe 2021; WDFW 2021n). The species occurs in natural habitats such as shrub-steppe and grasslands, as well as modified habitat such as pastures, orchards, highway margin, and canal banks (WDFW 2021n). Townsend's ground squirrels provide an important prey source for predators, including ferruginous hawk, as well as affecting soil structure and providing burrows to other species (WDFW 2021n).

Comprehensive population studies have not been conducted; however, long-term trends estimate declines of more than 70 percent (NatureServe 2021). The dominant threat to the species is habitat loss to agriculture and degradation of shrub-steppe habitat from cheatgrass and other invasive plants (WDFW 2021n). Townsend's ground squirrel is a candidate species for state listing and a state priority species.

Townsend's ground squirrel HCAs have been mapped along the ridge located adjacent to the northern perimeter of the Lease Boundary, extending into the Lease Boundary at a few locations. The Lease Boundary overlaps an HCA on the southern perimeter, west of Highway 395. While mapped HCAs are predominantly adjacent to the Lease Boundary, shrubland, grassland, fallow agricultural areas, and road margins may provide habitat for Townsend's ground squirrel. Data presented by Washington's NatureMapping Program indicate that the Lease

Boundary overlaps core Townsend's ground squirrel habitat (NatureMapping n.d.). Two Townsend's ground squirrel colonies occur in the northwest portion of the Lease Boundary, and another colony was documented within 350 feet of the Lease Boundary (Horse Heaven Wind Farm, LLC 2021a). However, field surveys were limited to a 25-acre parcel of agricultural private land in the southwestern portion of the Lease Boundary and did not cover shrub-steppe or grassland habitat. PHS data report nine occurrences of Townsend's ground squirrel within 2 miles of the Lease Boundary (**Figure 3.6-3**).

Black-tailed Jackrabbit

Black-tailed jackrabbit (*Lepus californicus*) range extends across most of western United States, with Washington State representing the northern edge of its range. In Washington State, core habitat is associated with arid steppe zones in the Columbia Basin (NatureMapping n.d.). Suitable habitat includes sagebrush and rabbitbrush dominated landscapes, as well as mixed shrub and grassland areas, where the species tends to select areas with higher shrub cover to obtain shelter (WDFW 2021l).

Population estimates are not available, and the species is considered common across much of its range in the United States (NatureServe 2021). Long-term trends are suggested to be stable across most of its range; however, localized declines in population are expected due to changes in habitat (NatureServe 2021). Threats to the species include habitat loss and mortality from persecution and disease (NatureServe 2021). Black-tailed jackrabbit is a candidate species for state listing and is a state priority species.

Black-tailed jackrabbits could occur in sagebrush and rabbitbrush habitat in the Lease Boundary. The Lease Boundary overlaps core black-tailed jackrabbit habitat (NatureMapping n.d.), although the Applicant reports that the species is uncommon within the Lease Boundary (Horse Heaven Wind Farm, LLC 2021a). Black-tailed jackrabbit was not recorded during field studies; however, species-specific surveys were not conducted (Horse Heaven Wind Farm, LLC 2021a). PHS data report five occurrences of black-tailed jackrabbit within 2 miles of the Lease Boundary **(Figure 3.6-3**).

White-tailed Jackrabbit

White-tailed jackrabbit (*Lepus townsendii*) range extends across much of western United States, north into southern Canada. In Washington State, the species' range generally consists of arid habitat within the Columbia plateau (WDFW 2021o). Suitable white-tailed jackrabbit habitat includes open bunchgrass habitat, often on hills and plateaus in summer and lower elevation sagebrush valleys in the winter (WDFW 2021o).

Local population estimates are not available; however, global populations are estimated at 10,000 to 1,000,000 individuals. Population trends are not available. Threats to the species include conversion of natural grassland and shrub habitat to agricultural land. White-tailed jackrabbit is a candidate species for state listing, and a state priority species.

Grassland and shrubland within the Lease Boundary could provide suitable habitat for white-tailed jackrabbit. Washington NatureMapping Program mapping identifies marginal habitat in the Lease Boundary (NatureMapping n.d.). White-tailed jackrabbits have not been recorded in the Lease Boundary, though species-specific surveys have not been conducted.

Pronghorn Antelope

Pronghorn antelope range extends across the western United States into southern Canada and northern Mexico. In Washington State, the species was extirpated in the 20th century; however, it was reintroduced on the Yakama

Reservation in 2011. Pronghorn antelope inhabit grasslands and shrublands. In winter, herds occupy areas with less snow cover (WDFW 2021p).

The current pronghorn antelope population around the Lease Boundary is estimated at 248 individuals (Fidorra et al. 2019). The population has increased since introduction in 2011, partially due to introduction of additional adults in 2017 and 2019 (Fidorra et al. 2019). Pronghorn antelopes are not listed in Washington State but have been included in this special status species section because of the species' importance to the Yakama Nation and recent re-introduction to the region.

Shrubland, grassland, and agricultural fields in the Lease Boundary provide suitable habitat for pronghorn antelopes. Winter surveys conducted by Fidorra and Peterson (2021) documented groups of pronghorn antelope (approximately three groups, including one larger group) in the Lease Boundary (Tetra Tech 2021b). Pronghorn antelope were recorded in Yakima, Klickitat, and Benton Counties, with larger groups (13 to 24) recorded in several locations in Benton County (Fidorra and Peterson 2021). Tetra Tech (2021b) reports that the majority of groups observed during the 2015 and 2016 survey conducted by Yakama Nation were recorded in rangeland, followed by cropland, then CRP land. Pronghorn antelopes were reported by the Applicant in the Lease Boundary during field surveys (Horse Heaven Wind Farm, LLC 2021a).

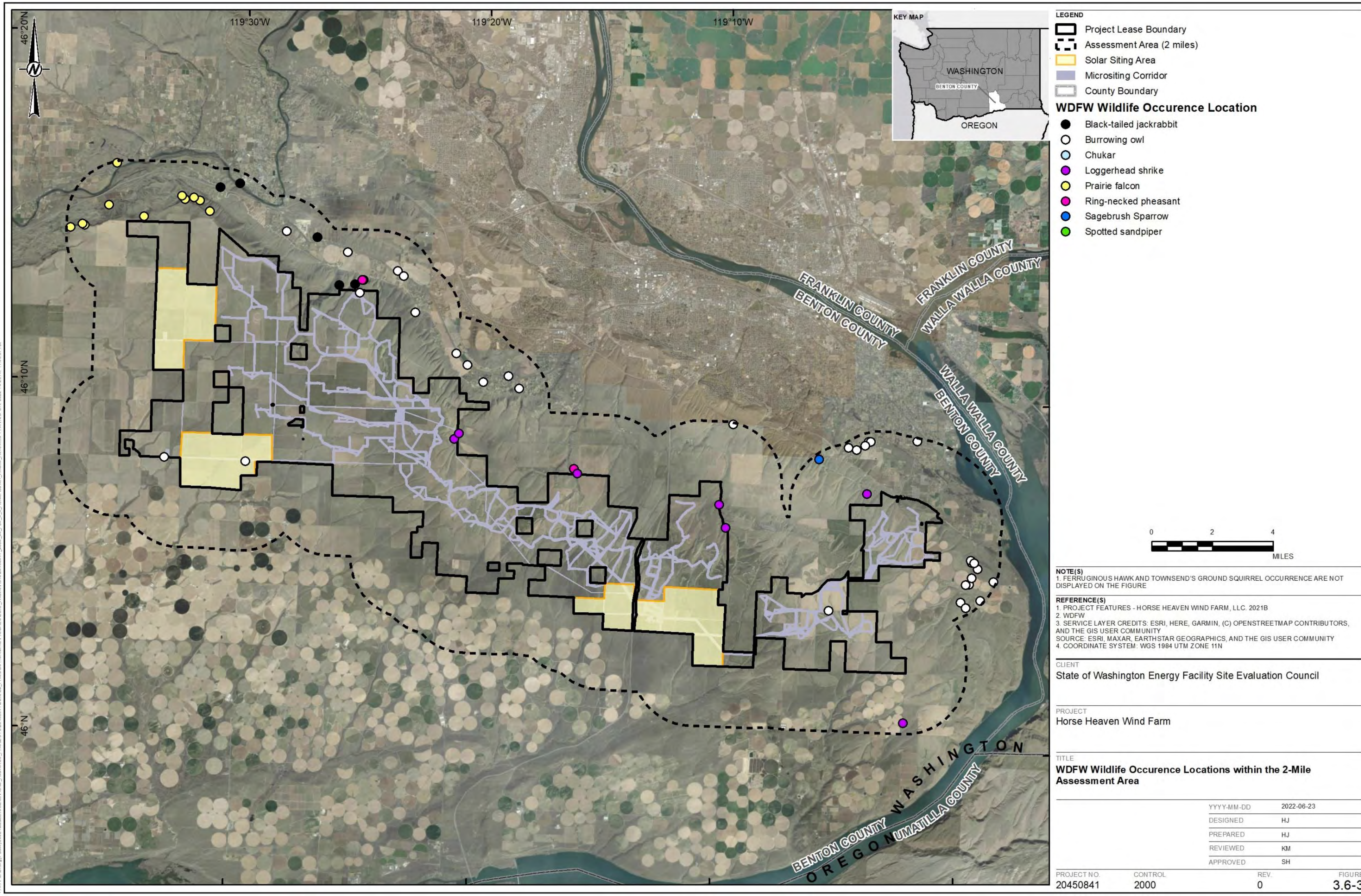


Figure 3.6-3: WDFW Wildlife Occurrence Locations within the 2-Mile Assessment Area

This Page Intentionally Left Blank

3.7 Energy and Natural Resources

This section characterizes the availability of existing energy and natural resources within the vicinity of the Lease Boundary for the proposed Horse Heaven Wind Farm (Project, or Proposed Action) and in the State of Washington. Section 4.7 discusses the Project's impact on energy and natural resource availability within the vicinity of the Lease Boundary and in Washington State. This evaluation of energy and natural resources is in accordance with Washington Administrative Code (WAC) 463-60-342 as it considers the impact of the Project's consumption of non-renewable and renewable resources.

3.7.1 Affected Environment

Benton County is in southeastern Washington State. The Columbia River bounds Benton County to the north, east, and south, while Klickitat and Yakima Counties bound Benton County to the west. The county is predominantly rural and agricultural in nature, with unincorporated areas making up most of the jurisdiction. The Lease Boundary is south of the Tri-Cities: Kennewick, Pasco, and Richland, Washington.

3.7.1.1 Power Generation and Demand

Regional Power Generation

Natural resources that contribute to power generation in Washington State can be broken into two categories: renewable and non-renewable, also referred to as conventional. Non-renewable supplies of energy are limited to the amounts that can be mined or extracted from the earth. Renewable energy, by contrast, is power from sources that are naturally replenishing. There are currently 106 conventional and renewable energy power plants operating in Washington. Washington's energy providers maintain the capacity to produce upwards of 92,366 thousand megawatt (MW) hours per year (DOE n.d.). In addition to its power-generating capacity, the State of Washington also contains five crude oil refineries that can process almost 652,000 barrels of crude oil per day (EIA 2022). This section provides a general summary of Washington's current power generation portfolio.

Non-Renewable Energy

Non-renewable energy sources include petroleum, hydrocarbon gas liquids, natural gas, coal, and nuclear energy. Currently, 21 conventional power plants operate in Washington. The "nameplate" generating capacity of Washington's conventional power plants is 6,990 MW (DOE n.d.). Nameplate capacity is the amount of electricity a generator can produce when running at its maximum designed output. Washington's non-renewable electricity-generating portfolio includes the following:

- **Natural Gas:** In 2019, natural gas was the second-largest source of in-state net power generation and was responsible for producing 15 percent of Washington's total electricity. In 2019, electricity produced by natural gas increased 9 percent from 2018. Washington's utilities and energy producers import natural gas because the state maintains no petroleum or natural gas reserves (EIA 2021).
- **Nuclear:** Nuclear power supplied about 8 percent of Washington's net electricity generation in 2019. The Columbia Generating Station nuclear power plant in south-central Washington is the state's fifth-largest power-producing facility by capacity and has been in operation since 1984. By resource, nuclear power represents Washington's third-largest source of energy (EIA 2021).
- **Coal:** Energy produced from coal represents Washington's fourth-largest source of energy. The TransAlta Centralia coal-fired power plant is the state's third-largest electricity-producing facility by capacity. In 2019, the facility produced less than 7 percent of Washington's electricity. In 2020, TransAlta Centralia retired one of its two coal-fired units, and the company plans to retire its last remaining operational unit in 2025. Although

Washington has upwards of 700 million tons of recoverable coal reserves, the last coal mine in the state closed in 2006 (EIA 2021).

Renewable Energy

Currently, 85 renewable power plants operate in Washington, with a combined generating nameplate capacity of 23,443 MW. Other than hydroelectric power, renewable resources account for almost 8 percent of the state's electricity generation in 2019 (EIA 2021). The following describes the status of renewable energy production in Washington:

- **Hydroelectric:** Washington is the nation's largest producer of hydroelectric power. Hydroelectric power typically accounts for more than 66 percent of Washington's electricity generation. Eight of the 10 highest electricity-producing facilities in Washington are hydroelectric power plants (EIA 2021).
- **Wind:** In 2019, wind accounted for about 80 percent of the state's nonhydroelectric renewable electricity. Wind has contributed 6 percent or more to the state's electricity production since 2013 (EIA 2021).
- **Solar:** Electricity generation from solar energy in Washington remains small. Almost all of the electricity produced from solar energy comes from rooftop and other small-scale (less than 1 MW) photovoltaic power installations (EIA 2021).
- **Biofuels:** Biofuels are transportation fuels such as ethanol and biomass-based diesel fuel that are made from biomass materials (EIA 2020). Washington has several biogas and biofuel projects, such as:
  - Anaerobic digesters that capture methane from dairy cow waste to fuel electricity generation
  - Production of 114 million gallons of biodiesel fuel per year from two biofuel facilities. This equals about 20 percent of Washington's annual consumption of diesel fuel (EIA 2021)

Energy Infrastructure within the Project Vicinity

The following is a summary of the existing energy infrastructure within the vicinity of the Lease Boundary:

- The Nine Canyon Wind Project is just southeast of Kennewick in south-central Benton County. The Nine Canyon Wind Project is less than 1 mile from the Lease Boundary at its nearest point. The project includes 63 wind turbines constructed in three phases between 2002 and 2008. The wind farm has a nameplate generating capacity of 95.9 MW of electricity (Energy Northwest n.d.).
- Two Bonneville Power Administration high-voltage transmission lines intersect the Lease Boundary. The McNary-Franklin No. 2 Transmission Line runs northeast to southwest through the east-central portion of the Lease Boundary. The McNary-Badger Canyon No. 1 Transmission Line runs north to south, adjacent to the western portion of the Lease Boundary (Horse Heaven Wind Farm, LLC 2021).
- There are numerous existing transmission lines and substations located north of the Lease Boundary that traverse the area south of the Tri-Cities east to west (Horse Heaven Wind Farm, LLC 2021).

Local Energy and Natural Resource Providers

Horse Heaven Wind Farm, LLC (Applicant) has identified the following utilities and suppliers as potential providers of energy and natural resources for the Project:

- **Public Utility District (PUD) No. 1 of Benton County**: Benton PUD's business operations include energy purchases, generation, transmission, distribution, and sale of electricity. Benton PUD's operations cover approximately 939 square miles of Benton County. Benton PUD's properties include 37 substations, approximately 91 miles of 115-kilovolt transmission line, and 1,590 miles of distribution lines (Benton PUD 2021).

- **Benton Rural Electric Association (REA)**: Benton REA is a not-for-profit, consumer-owned electric cooperative. Benton REA currently serves more than 11,000 members in Benton, Yakima, and Lewis Counties in Washington. The Lease Boundary is located within Benton REA District 3 (Benton REA 2018).
- **City of Kennewick Utility Services Division of Public Works**: Kennewick is responsible for providing public water service, utility management, and water system development within its water service boundary. Kennewick provides water service to approximately 80,986 people throughout its water service area boundary, extending beyond its corporate limits (City of Kennewick 2017).

Regional Energy Demand

Washington benefits from access to abundant, low-cost energy originating from renewable energy resources. Washington's net generation often exceeds the state's electricity demand. This allows energy producers to send excess power to the Western Interconnection (EIA 2021). Western Interconnection is a network consisting of approximately 136,000 miles of transmission lines. It spans 1.8 million square miles in all or part of 14 states, the Canadian provinces of British Columbia and Alberta, and the northern part of Baja California in Mexico and serves over 80 million people (Western Electricity Coordinating Council 2021).

Table 3.7-1 shows the forecast electricity demand for the four states (Washington, Oregon, Idaho, and Montana) that make up the Northwest Power and Conservation Council, compared to 2021's expected use. The Northwest Power Act of 1980 authorized the establishment of the Northwest Power and Conservation Council with the intent of conserving natural resources and assuring reliable access to energy throughout the region. As shown in the table, the region's energy needs in 2041 are anticipated to be 21,532 to 27,304 average MW for the entire year (Northwest Power and Conservation Council 2021). This suggests that by 2041, the region could see anything from a reduction in demand for electricity to a 22.5 percent increase in demand.

Table 3.7-1: Pacific Northwest Forecast Range of Electricity Use in Average Megawatts by Sector

Sector	Expect 2021 Use	2041 Forecast (Low Estimate)	2041 Forecast (Medium Estimate)	2041 Forecast (High Estimate)
Residential	8,148	8,674	8,860	9,049
Commercial	5,938	5,833	6,202	6,673
Industrial	6,186	4,147	5,892	7,541
Transportation	67	733	816	904
Street Lighting and Water Services	271	252	280	303
Irrigation	1,016	941	1,164	1,465
Data Centers	657	952	1,179	1,369
Total	22,283	21,532	24,393	27,304

Source: Northwest Power and Conservation Council 2021

3.7.1.2 Water Utilities and Demand

Sections 3.4 and 4.4 evaluate the Project's potential impacts on water resources. There are no public water supply wells within the Lease Boundary (Horse Heaven Wind Farm, LLC 2021). The Applicant has indicated that the City of Kennewick would supply water for the Project's construction stage. The Kennewick Utility Services Division of Public Works is responsible for the city's water treatment plant, wastewater treatment plant, wastewater collection, and water distribution programs within its jurisdiction.

Since 2007, Kennewick has experienced decreasing per-capita water demand. Between 2007 and 2014, Kennewick's water service area population increased by more than 19 percent, but the volume of water supplied to the system only increased by approximately 5 percent. Kennewick has attributed the decrease in demand to water use efficiency practices and the repair of water system leaks.

Overall, water demand within Kennewick's system is expected to increase by approximately 33 percent by the end of 2035. Kennewick's existing water sources are sufficient to meet the projected demands of the system through 2025. Beyond 2025, additional source capacity will be needed to meet Kennewick's water demands.

Kennewick completed construction of an aquifer storage and recovery (ASR) well in 2014. Ongoing testing of the ASR well and the aquifer's storage capacity has been performed since the well was constructed. If the ASR well becomes fully developed and receives approval from regulatory agencies, it may provide a maximum of 2,080 gallons per minute. Even with the addition of the ASR well, however, Kennewick is projected to have a slight source capacity deficiency by 2035 (City of Kennewick 2017).

Water Rights

Revised Code of Washington 90.03 establishes water rights appropriation standards and procedures. The State of Washington does not require a water rights permit if the water originates from a permitted utility (Ecology n.d.).

3.7.1.3 Construction Aggregate Resources and Demand

Sand, gravel deposits, and bedrock may be mined or quarried to produce raw materials known as aggregates. Aggregates are necessary for making ready-mixed concrete, asphalt, and many other building materials. Aggregates are required to build and maintain infrastructure such as:

- Roads, highways, and bridges
- Homes, buildings, and schools
- Public works projects

Construction aggregate is a non-renewable resource composed of sand and gravel. In 2017, the State of Washington was listed among the top 10 producers of construction aggregate. Mines within Washington produced 33,300 thousand metric tons of construction sand and gravel from 206 active pits and dredging operations (USGS 2020). In 2020, demand for aggregate in Washington exceeded 500 million tons, and forecasts predict that by 2030, aggregate demand could exceed 1,500 million tons (DNR 2022).

Concrete is also a non-renewable resource that is usually a mixture of aggregates and paste. The aggregates are sand and gravel or crushed stone, and the paste consists of water and cement. Typically, concrete is a mixture of about 10 to 15 percent cement, 60 to 75 percent aggregate, and 15 to 20 percent water. There are several active aggregate mining operations within the vicinity of the Lease Boundary. The nearest quarry to the Lease Boundary is in Kennewick, Washington. Ash Grove in Seattle, Washington, is the only cement plant within the state. Ash

Grove makes 33 percent of all the cement used in Washington. In 2015, the State of Washington consumed 1.8 million metric tons of cement (Portland Cement Association 2016, 2019).

This Page Intentionally Left Blank

3.8 Land and Shoreline Use

This section describes existing land use and shoreline resources, as well as the regulatory setting, for the proposed Horse Heaven Wind Farm (Project, or Proposed Action) vicinity. The Project vicinity includes the areas 4 miles south/southwest of the City of Kennewick, Washington, and the larger Tri-Cities urban area along the Columbia River. The Project's alignment with relevant land use documents and ordinances and adopted state, county, and local plans, goals, and policies is presented in **Appendix 3.8-1**. An evaluation of proposed changes to existing land use is presented in Section 4.8.

Regulatory Setting

Comprehensive land use plans specify the types of present and future land development that can occur within a specified area. In most cases, the preparation of comprehensive land use plans occurs through a public participation process. Once the plans are finalized, publicly elected officials approve them. The intent of this process is to capture local values and attitudes toward future development. Within the State of Washington, land use regulations and zoning ordinances vary by local government jurisdiction. For instance, Benton County, Washington's, comprehensive land use plan and zoning ordinances only apply to the unincorporated areas and communities within its geographical boundaries. Similarly, the comprehensive land use plans prepared by the incorporated communities only apply to land use management within their jurisdictional boundaries.

The Washington State Growth Management Act (GMA) (Revised Code of Washington [RCW] 36.70A.040) requires that cities and counties adopt comprehensive, long-term land use plans for physical development within their jurisdictions. The comprehensive land use plans include a land use element that establishes the desired pattern of appropriate land use, as well as policies and guidelines for the development of those uses. The land use element designates the proposed general distribution and general location and extent of the uses of land, where appropriate, for the following purposes:

- Agriculture and timber production
- Housing
- Commerce and industry
- Recreation and open spaces
- General aviation airports
- Public utilities and facilities
- Other land uses

Local governments and their resource managers use local zoning ordinances, specific plans, and maps to implement the land use element within a comprehensive land use plan.

Similar to the State of Washington's requirements for comprehensive land use plans, the Shoreline Management Act (SMA) of 1971 (RCW 90.58) requires all counties and most towns and cities with shorelines in Washington to develop and implement Shoreline Master Programs (SMP). The SMA applies to all 39 Washington counties and about 250 towns and cities with stream, river, lake, or marine shorelines. Under the SMA, SMPs must contain a public access element, including provisions for public access to publicly owned areas. The SMA also requires that applicable communities include an element for preserving and enlarging recreational opportunities. The

Washington State Department of Ecology has adopted the Shoreline Master Program Guidelines (Chapter 173-26 Washington Administrative Code), which require local government review and updates of SMPs.

3.8.1 Affected Environment

Benton County is in southeastern Washington State. The Columbia River bounds Benton County to the north, east, and south, while Klickitat and Yakima Counties bound Benton County to the west. Benton County is located at the confluence of the Columbia, Yakima, and Snake Rivers. The Yakima River runs through the middle of the county to its confluence with the Columbia River in Richland, Washington. The county also features several mountains and ridges such as Horse Heaven Hills, Rattlesnake Mountain, Badger Mountain, and Candy Mountain (Benton County 2021a).

Benton County comprises a total of 1,115,673 acres. The U.S. Department of Energy's Hanford Reservation occupies 24 percent of the landmass in Benton County. The unincorporated areas of the county are predominantly rural and agricultural in nature, with unincorporated areas making up most of the county. Unincorporated communities fall under the county government's jurisdiction. The incorporated cities within Benton County include Benton City, Kennewick, Prosser, Richland, and West Richland (Benton County 2021a). **Table 3.8-1** illustrates the distribution of land use types in Benton County. Several unincorporated communities fall under the county government's jurisdiction.

Table 3.8-1: Land Use Types and/or Designation and Distribution in Benton County

Land Use Type and/or Designation	Corporation	Acres	Square Miles	Percentage
Cities and Urban Growth Areas	Incorporated	72,245	113	6.58
Hanford Site	Federal Lands (Not Applicable)	266,351	416	24.27
Hanford Reach	Federal Lands (Not Applicable)	12,443	19	1.13
GMA Agriculture	Unincorporated	647,107	1,011	58.96
Open Space Conservation	Unincorporated	2,108	3	0.19
Public	Unincorporated	15,163	24	1.38
Rural Lands 1	Unincorporated	1,182	2	0.11
Rural Lands 1–3	Unincorporated	318	0	0.03
Rural Lands 5	Unincorporated	74,039	116	6.75
Rural Lands 20	Unincorporated	1,813	3	0.17
Community Center	Unincorporated	500	1	0.05
Community Commercial	Unincorporated	26	0	0.00
Interchange Commercial	Unincorporated	325	1	0.03
General Commercial	Unincorporated	202	0	0.02
Light Industrial	Unincorporated	1,333	2	0.12
Heavy Industrial	Unincorporated	2,344	4	0.21
Total Unincorporated Area	Not Applicable	746,460	1,166	68.01
Total County Area	Not Applicable	1,097,499[a]	1,715	100

Source: Benton County 2021a
Note:
[a] An acreage discrepancy exists in Benton County Comprehensive Plan for Total County Area
GMA = Washington State Growth Management Act

Project Geography

The Project would consist of a renewable energy generation facility within the Horse Heaven Hills area of unincorporated Benton County, Washington. The Project's Lease Boundary is located approximately 4 miles south of the Tri-Cities urban area, along the Columbia River. The cities of Kennewick, Pasco, and Richland, Washington, make up the Tri-Cities area. The geographical extent of the Project would be as follows:

- The Lease Boundary encompasses approximately 72,428 acres.
- The Project's Wind Energy Micrositing Corridor encompasses 11,850 acres and consists of the area where the turbines and supporting facilities would be located.
- The Solar Siting Areas encompass 10,755 acres located within the Lease Boundary.
- Approximately 908 acres within the Project's Wind Energy Micrositing Corridor and Solar Siting Areas overlap.
- The elevation of the Lease Boundary ranges from 604 to 2,051 feet above mean sea level (Horse Heaven Wind Farm, LLC 2021).

The topography within the Lease Boundary is dominated by rolling hills bisected by meandering canyons, some of which contain ephemeral (seasonal) or intermittent drainages. There are no major rivers or other perennial streams within the Lease Boundary (Heaven Hills Wind Farm, LLC 2021).

3.8.1.1 Land Ownership within Study Area

The Lease Boundary serves as the primary study area for land ownership; however, land uses adjacent to the Lease Boundary can provide context for consistency evaluations. Existing land use within 1 mile of the Lease Boundary predominantly comprises agricultural lands, agricultural support facilities, and the Nine Canyon Wind Project. In the Application for Site Certification (ASC) for the Project, Appendix F presents a comprehensive list of Lease Boundary parcels, owners, and acres and a legal description of affected lands. The 72,428-acre Lease Boundary equates to approximately 6.5 percent of Benton County's territory and 11 percent of the land use designation "GMA Agriculture." The ASC indicates that Turbine Option 1 would involve more land disturbance than Turbine Option 2. The Project's total land disturbance of 6,869 acres under Turbine Option 1 is equal to approximately 1 percent of Benton County's lands designated as GMA Agriculture and 0.6 percent of the county's total territory.

According to the ASC, most of the Lease Boundary (approximately 69,556 acres) is privately owned and actively managed for dryland agriculture and livestock grazing. Among the private lands that make up the Lease Boundary, multiple parcels have been enrolled in the U.S. Department of Agriculture's Conservation Reserve Program (CRP). The acreage currently enrolled in the CRP within the Lease Boundary is unknown. Additionally, the Lease Boundary includes 2,739 acres in the state trust system managed by the Washington State Department of Natural Resources (DNR). The Lease Boundary includes all or part of five DNR-managed parcels that are state trust lands. The Applicant proposes the following actions on DNR-managed parcels:

- Three of the DNR-managed parcels would include turbines and supporting facilities
- One DNR-managed parcel would be used for supporting facilities
- One DNR-managed parcel is a possible site for the Project's County Well Road solar component (Horse Heaven Wind Farm, LLC 2021)

Conservation Reserve Program Lands

The CRP is a federally funded voluntary program that contracts with agricultural producers so that environmentally sensitive agricultural land is not farmed or ranched but instead devoted to conservation benefits. The U.S. Department of Agriculture Farm Service Agency provides participants with rental payments and cost-share assistance. Contract duration is between 10 and 15 years (USDA 2019). The Agricultural Act of 2014 (Public Law 113-79) allows landowners the opportunity to opt out of their CRP contracts unless the land is supporting enhanced wildlife habitat, is protecting sensitive aquatic and environmental resources, or has specifically been contracted in a manner to prevent a landowner from opting out.

State-managed Lands

The Washington Commissioner of Public Lands guides DNR's management of state-owned lands. DNR's land policies come from numerous sources, such as the federal Organic Enabling Act of 1889, the state constitution, state statutes, and various boards, councils, and commissions. The lands that the DNR manages on behalf of Washington State citizens and beneficiaries fall into three main categories: state trust lands, state-owned aquatic lands, and state natural areas (DNR 2021).

State Trust Lands

State trust lands managed by the DNR are different from other publicly managed lands in that they must be used to generate revenue for their designated beneficiaries, such as public schools, universities, and correctional institutions. The DNR currently manages 3 million acres of these federally granted trust lands. Classes of actions that the DNR approves for revenue-generating activities include:

- Harvesting timber, biomass byproducts, and other forest products
- Leasing lands for agricultural purposes, such as orchards and vineyards, irrigated agriculture, dryland crops, and grazing
- Leasing communications sites, mining and mineral leases, wind farms and energy production, commercial properties, and rights-of-way (DNR 2021)

In addition to earning income, activities on trust lands are managed to protect habitat for native plant and animal species, provide clean and abundant water, and offer diverse public recreation opportunities. **Figure 3.8-1** illustrates the location of DNR-managed state trust lands within the Lease Boundary and Project vicinity, as well as other publicly owned lands within the region.

3.8.1.2 Benton County Comprehensive Plan

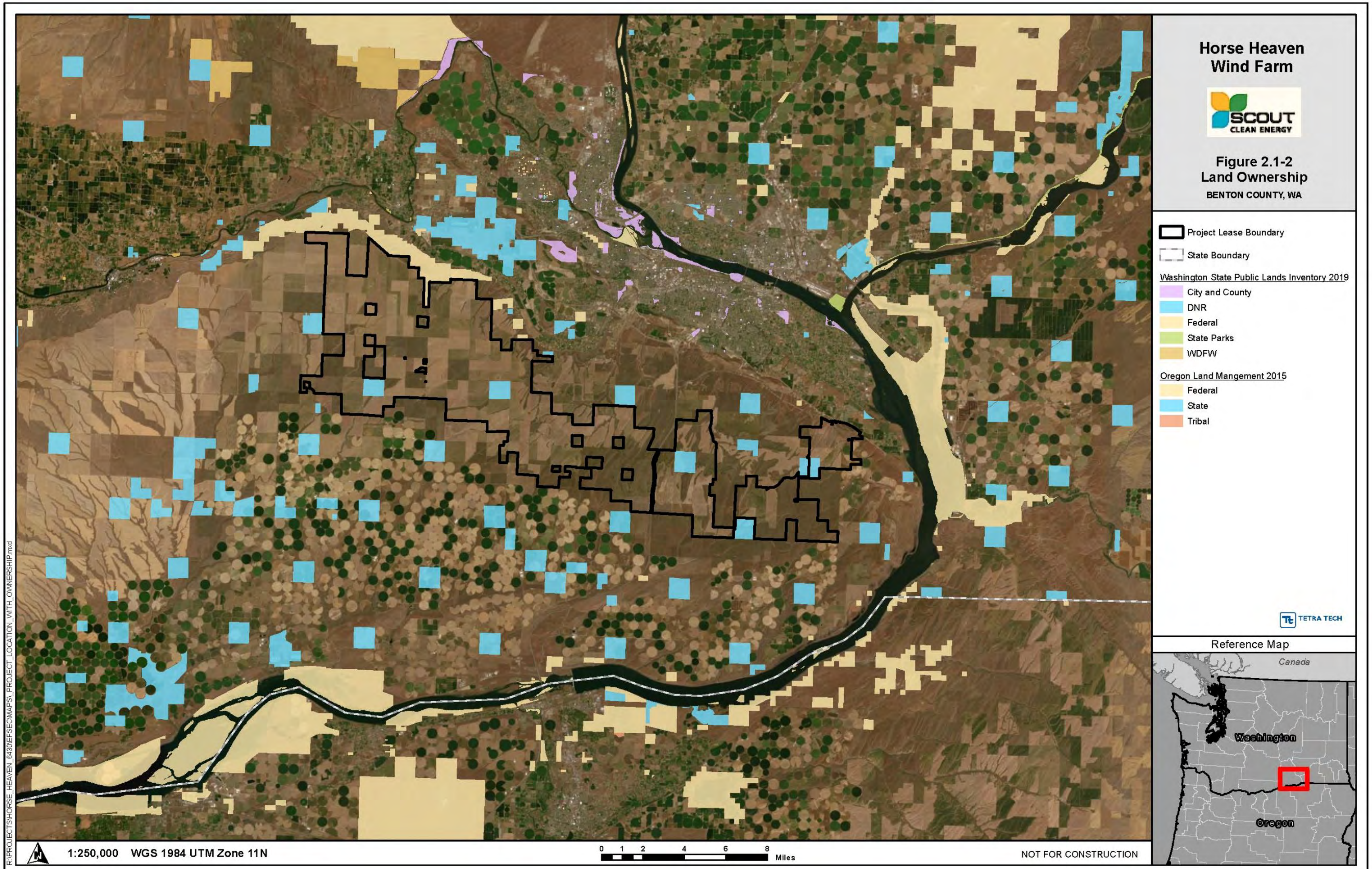
Planning in Benton County's unincorporated and urban areas is guided by the Benton County Comprehensive Plan. In addition to providing planning guidance for unincorporated areas, the plan addresses regional planning issues and coordinates growth among all jurisdictions. It also coordinates land use, transportation, and capital facilities by focusing planning, scheduling, financing, and construction provisions to provide the identified levels of service in advance of development or upon demand.

All development regulations in Benton County are required to be consistent with the Benton County Comprehensive Plan. These include, but are not limited to, the zoning code, subdivision code, Critical Areas Ordinance, SMP, and permit review processes. For instance, all codes related to traffic and utilities implement the comprehensive land use plan's goals and policies.

The Benton County Comprehensive Plan's purpose and intent is to provide for local needs relating to the use of land and infrastructure, including the protection of property and water rights and, in so doing, meet the state's minimum planning law requirements. In accordance with RCW 36.70A.070, the comprehensive land use plan includes the following required elements: land use, rural, housing, transportation, capital facilities, and utilities.

The land use element presents the framework within which future growth and development will occur consistent with community objectives and the requirements of law. Consistent with GMA requirements, the land use element designates the proposed general distribution, location, and extent of land uses for agriculture, timber production, housing, commerce, industry, recreation, open spaces, general aviation airports, public utilities, public facilities, and other functions, as applicable, and describes development densities and projections for future population growth (Benton County 2021a).

This Page Intentionally Left Blank



Source: Horse Heaven Wind Farm, LLC 2021

Figure 3.8-1: Land Ownership within Project Vicinity

3.8.1.3 Benton County Shoreline Management Program

Benton County adopted an SMP update in 2021 pursuant to the SMA. Benton County prepared the SMP to align with the goals and policies outlined in the Benton County Comprehensive Plan. The SMP is a set of goals, policies, and regulations pertaining to shoreline development in the county. The SMA encourages reasonable and appropriate development of shorelines, with an emphasis on water-oriented uses that require a shoreline location and support economic development. The SMP's intent is to protect "the natural character of the shorelines, the land, vegetation, wildlife, and shoreline environment" (Benton County 2021b). Finally, the SMP "promotes public access and provides opportunities to enjoy views and recreational activities in shoreline areas" (Benton County 2021b).

Benton County's shoreline jurisdiction encompasses 330 miles of the Columbia and Yakima Rivers. The total acreage of upland shorelands regulated by Benton County's SMP is 14.93 square miles (Benton County 2021b). In accordance with the SMA, the Benton County SMP addresses the following:

- The Yakima and Columbia Rivers
- Land within 200 feet of the ordinary high-water mark of the Yakima and Columbia Rivers
- The Yakima and Columbia River floodways
- The contiguous 100-year floodplain extending up to 200 feet inland of the Yakima and Columbia River floodways
- Wetlands associated with the Yakima and Columbia Rivers (Benton County 2021b)

Fifty-eight percent of Benton County's shorelands occur along the Columbia River, and the remaining 42 percent occur along the Yakima River. Both the Columbia and the Yakima Rivers within Benton County are classified as Shorelines of Statewide Significance. This means that, under Washington State law, Benton County must apply specific shoreline management preferences and priorities to the Yakima and Columbia Rivers. Federal lands make up approximately 35 percent of the area within the county's shoreline jurisdiction (Benton County 2021b).

The Yakima River passes north of the western portion of the Lease Boundary, approximately 1.5 miles away at its closest location to the Project site. The Yakima River flows eastward to its confluence with the Columbia River near Richland, Washington. The Columbia River passes north, east, and south of the eastern portion of the Lease Boundary. At its closest location, the Columbia River is approximately 1.3 miles from the Lease Boundary. The Columbia River bends around the eastern portions of the Lease Boundary and ultimately flows west toward the Pacific Ocean (Horse Heaven Wind Farm, LLC 2021).

3.8.1.4 Specific Land Uses within the Study Area

Land use designations are property-specific and identify the type and intensity of land uses that a comprehensive land use plan allows. The Benton County Comprehensive Plan (2020 update) identifies 13 designations within unincorporated Benton County. Of the 13 land use designations, the entire Lease Boundary occurs within the GMA Agriculture designation and the corresponding zoning ordinance GMA Agriculture. **Table 3.8-2** provides a description of land use designation and corresponding zoning ordinance. **Figure 3.8-2** shows the Lease Boundary and the Benton County Comprehensive Plan land use designations for the Project vicinity.

Benton County has adopted zoning ordinances and maps necessary to bring the county's zoning code into compliance with the goals and policies of the adopted Benton County Comprehensive Plan. Benton County prepared its zoning ordinances and zoning maps to implement the community vision and future as expressed by the public in the Benton County Comprehensive Plan. **Figure 3.8-3** illustrates the zoning ordinances for the Lease Boundary and Project vicinity. Benton County Code zoning ordinances and maps classify land into “Districts” according to the land use designations in the adopted comprehensive plan. The effect of zoning is to provide stability and certainty for future development by:

- Implementing land use maps by grouping compatible land uses and excluding incompatible land uses
- Identifying areas of investment and assisting economic sector planning
- Enabling government to assess the need for and fund capital and public service projects
- Enabling public utilities to calculate potential demand and plan capital facilities
- Providing assurances to homeowners that their property values will be protected

Table 3.8-2: Lease Boundary Land Use Designations and Corresponding Zoning Ordinance

Land Use Designation	Description	Corresponding Zoning Ordinance	Zoning Ordinance
GMA Agriculture	This land use includes agricultural land such as dryland and irrigated land identified by Benton County based on the criteria established by the GMA. A GMA Agricultural District zone conserves agricultural lands by establishing a 20-acre minimum parcel size and limits the range of other land uses to those dependent on, supportive of, ancillary to, or compatible with agricultural production as the principal land use.	GMA Agriculture District	Benton County, Washington Code 11.17.030 through 11.17.070 specifies wind farms and major solar-generating facilities as land uses that may be permitted for lands zoned GMA Agricultural District with approval of a conditional use permit by the Hearings Examiner.

Sources: Benton County 2021a, 2021c
GMA = Washington State Growth Management Act

Agriculture – Benton County

Benton County contains agricultural lands of long-term commercial significance. RCW 36.70A.030(3) characterizes agricultural lands of long-term commercial significance as land with the following characteristics:

- Growing capacity
- Productivity
- Soil composition of the land for long-term commercial production

Washington Administrative Code 365-190-050(3) states that “lands should be considered for designation as agricultural resource lands based on three factors:”

- Land specifically is not characterized by urban growth
- Land is used or is capable of being used for agricultural production

- Land has long-term commercial significance for agriculture

Benton County's agricultural economy is diverse in crops grown and livestock raised. The largest crop type is in wheat and wheat fallow, while other extensive crop types include corn, grapes, potatoes, apples, and onions. Benton County ranks third in Washington State by market value of agricultural products sold (crops and livestock), totaling about $923.2 million in value (Benton County 2017).

Table 3.8-3 shows the breakdown of lands designated as GMA Agriculture in Benton County. Agricultural lands in Benton County are primarily used for dryland agriculture (47 percent), with the remaining areas used for irrigated agriculture (40 percent) and rangelands (13 percent). When considering rural "other," agricultural land type by percentage changes slightly with the amount of rangeland increasing and dryland agriculture decreasing. The rural "other" land use includes a mix of agricultural and non-agricultural uses (BERK 2016). The following describes the three main agricultural land uses in Benton County:

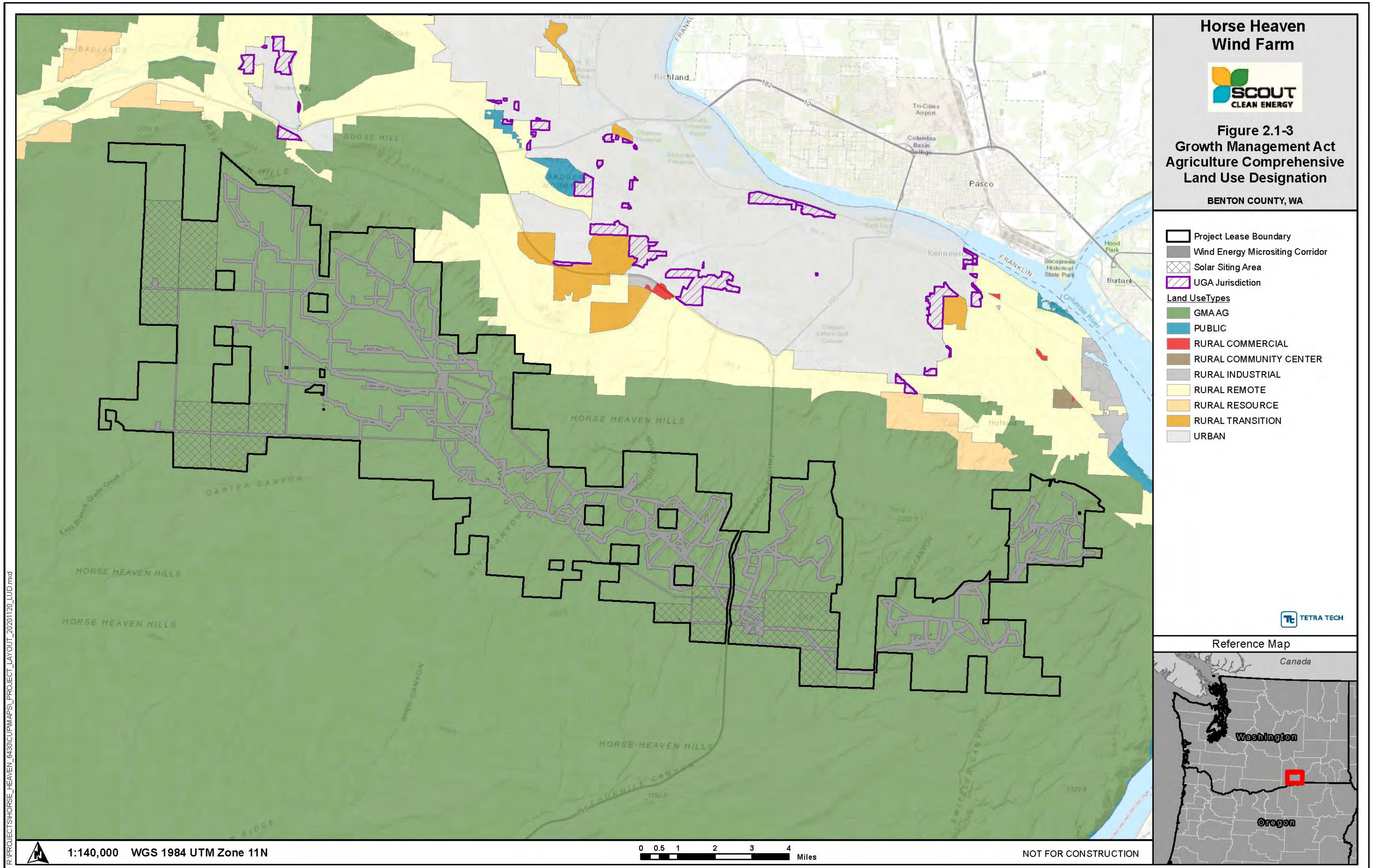
- **Dryland Agriculture**: Dryland agriculture occurs in geographic areas where biological productivity is normally limited by available soil moisture. Farmers overcome the lack of soil moisture through management techniques such as summer fallow. The widespread practice of summer fallow stores moisture for two years for use by a single crop. Farmers alternate between crop and non-crop years, and control weeds during the non-crop years through either mechanical or chemical methods (WSU 1992).
  - Within Benton County, dryland agriculture primarily occurs in the Horse Heaven and Rattlesnake Hills areas.
  - Economically viable dryland agriculture typically requires thousands of acres (Benton County 2021a).
- **Irrigated Agriculture**: The purpose of irrigation is to supplement natural precipitation so that the moisture requirements of crops are met. Limited water resources prevent irrigation development in large areas of Washington State (WSU 1992).
- **Rangeland**: Range and pasture lands are diverse types of land where the primary vegetation produced is herbaceous plants and shrubs. These lands provide forage for beef cattle, dairy cattle, sheep, goats, horses and other types of domestic livestock. Also, many species of wildlife, ranging from big game such as elk to butterflies and nesting song birds such as meadowlarks, depend on these lands for food and cover. Native prairies are also considered part of these landscapes (NRCS n.d.).

Table 3.8-3: GMA Agriculture Type and Designated Acreage in Benton County

GMA Agriculture Land Type	Countywide Total Acres	Percentage of Total[a]
Dryland	304,839	39.65
Irrigated	296,432	38.56
Rangeland	112,190	14.59
Rural "other"	55,275[b]	7.19
Total Agriculture	768,736	

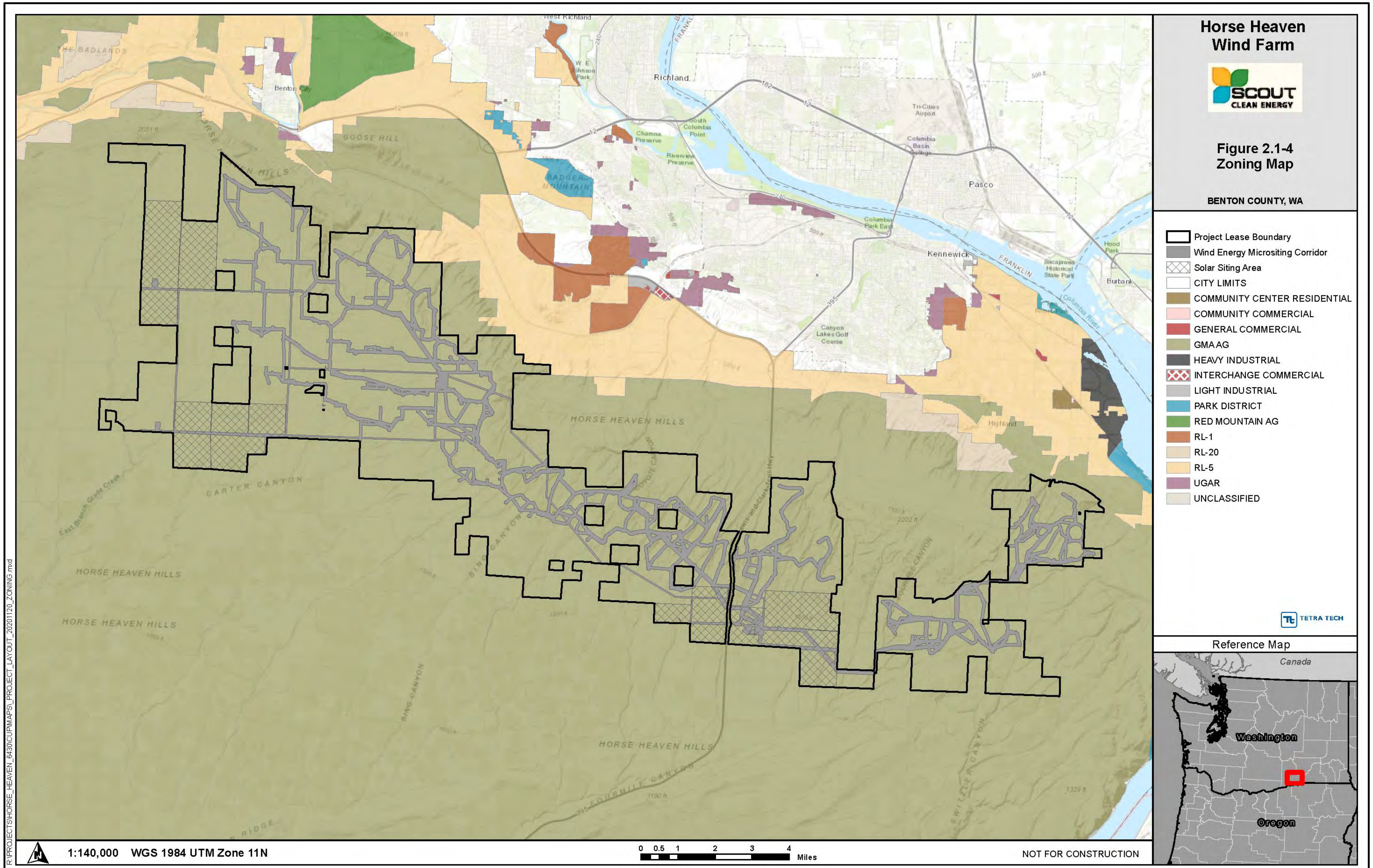
Sources: BERK 2016; Benton County 2021a
Notes:
[a] Minor discrepancies in the total sum are due to rounding
[b] Includes agricultural and non-agricultural uses
GMA = Growth Management Act

This Page Intentionally Left Blank



Source: Horse Heaven Wind Farm, LLC 2021

Figure 3.8-2: Benton County, Washington Comprehensive Plan Land Use Designations



Source: Horse Heaven Wind Farm, LLC 2021

Figure 3.8-3: Benton County, Washington Project Vicinity Zoning Ordinance Map

3.8.2 Land Use Goals and Policies

Goals are broad statements of intent and philosophy expressing countywide values and attitudes. Goals are used as a general guide for action by the county. Policies provide the basis for decision-making and specific courses of action, which move the county toward attaining its adopted goals. Policies have a major influence because decisions, actions, and programs should neither conflict nor be inconsistent with adopted policy. **Table 3.8-4** lists the Benton County Comprehensive Plan goals and policies that are relevant to the Project.

Table 3.8-4: Applicable Benton County Comprehensive Plan Policies and Goals

Comprehensive Plan Element	Goal/Policy
Land Use	Goal 1: Ensure that land uses are compatible with surrounding uses that maintain public health, safety, and general welfare.
Land Use	Goal 1 Policy 1: Maintain a mix of land uses that supports the character of each rural community.
Land Use	Goal 1 Policy 3: Maximize the opportunities for compatible development within land use designations to serve a multitude of compatible uses and activities.
Land Use - Rural Lands	Goal 6: Preserve rural lifestyles outside UGAs and incorporated areas while accommodating new population growth consistent with the protection of rural character.
Land Use - Rural Lands	Goal 6 Policy 2: Development in rural areas is typified by large lots and less dense development. Favoring development that is less dense and has larger lots helps maintain the rural character of designated rural areas and supports the protection of ground and surface water.
Land Use - Rural Lands	Goal 6 Policy 3: Designated rural areas will be utilized to reduce the inappropriate conversion of agricultural lands, prevent sprawling low-density development and assure that rural development is compatible with surrounding rural and agricultural areas.
Land Use - Rural Lands	Goal 6 Policy 14: Support and encourage the use of and application of Firewise principles and other fire risk reduction measures consistent with the Benton County Natural Hazard Mitigation Plan and Community Wildfire Protection Plan to reduce fire risk for urban development, urban subdivisions, rural subdivisions and large rural developments susceptible to wildfires. Encourage the implementation of the Firewise principles, or similar best management measures, applicable to individual lots on all lots at risk from wildfires.
Land Use - Rural Lands	Goal 6 Policy 15: Encourage new rural development away from the 100-year floodplain, and as guided in the County’s Flood Damage Prevention Ordinance, CAO, and SMP.
Natural Resources	Goal 1: Conserve and maintain agricultural land of long-term commercial significance as the local natural resource most essential for sustaining the County's agricultural economy.
Natural Resources	Goal 1 Policy 1: Conserve areas designated "GMA Agriculture" in the Comprehensive Plan for a broad range of agricultural uses to the maximum extent possible and protect these areas from the encroachment of incompatible uses.
Natural Resources	Goal 1 Policy 3: Recognize that only uses related or ancillary to, supportive of, complementary to, and/or not in conflict with agricultural activities are appropriate in areas designated GMA Agriculture.
Water Resources	Goal 1: Conserve, maintain, and manage existing ground and surface water resources to meet existing and future water supply needs for cities, farms, industry, and rural growth.
Water Resources	Goal 4: Protect and enhance surface water resources to support rivers, streams, and wetlands that support fish and wildlife species and associated habitats.

Table 3.8-4: Applicable Benton County Comprehensive Plan Policies and Goals

Comprehensive Plan Element	Goal/Policy
Critical Areas	Goal 1: Protect the functions and values of critical areas within the county with land use decision-making and development review.
Critical Areas	Goal 1 Policy 1: Apply standards, regulations, and mitigation strategies to development during the permitting and development approval process that protects critical areas functions and values.
Critical Areas	Goal 2: Protect life and property and avoid or mitigate significant risks to public and private property and to public health and safety that are posed by frequently flooded and geologic hazard areas.
Critical Areas	Goal 2 Policy 1: Limit developments in areas with higher risk for natural disaster or geologic hazard unless it can be demonstrated by the project proponent that the development is sited, designed, and engineered for-long term structural integrity and that life and property on- and off-site are not subject to increased risk as a result of the development.
Critical Areas	Goal 3: Protect the County's natural areas, shorelines, and critical areas as unique assets to the community.
Critical Areas	Goal 3 Policy 1: Use the CAO, SMP, SEPA, and other ordinances, as applicable, to designate and protect critical areas and the natural environment.
Critical Areas	Goal 5: Achieve balance among economic uses of land and critical areas protection.
Critical Areas	Goal 5 Policy 1: Work with state, federal, and local agencies and other County stakeholders regarding the application of environmental protection laws and regulations.
Economic Development	Goal 2: Expand employment opportunities in unincorporated Benton County.
Economic Development	Goal 3: Provide areas for the location of light and environmentally acceptable heavy industrial uses, while minimizing impacts on surrounding rural uses.
Economic Development	Goal 3 Policy 2: Do not locate non-agricultural related industry on "GMA Agriculture" designated land.
Parks, Recreation, Open Space, and Historic Preservation	Goal 3: Conserve visually prominent naturally vegetated steep slopes and elevated ridges that define the Columbia Basin landscape and are uniquely a product of the ice age floods.
Parks, Recreation, Open Space, and Historic Preservation	Goal 3 Policy 1: Identify and preserve historically significant structures and sites whenever feasible.
Parks, Recreation, Open Space, and Historic Preservation	Goal 4: Preserve significant historic structures, districts, and cultural resources that are unique to Benton County.
Parks, Recreation, Open Space, and Historic Preservation	Goal 4 Policy 1: Coordinate with local tribes to protect historic and cultural resources.
Parks, Recreation, Open Space, and Historic Preservation	Goal 4 Policy 2: Preserve archaeologically significant sites by siting and designing development to avoid or mitigate impacts.

Table 3.8-4: Applicable Benton County Comprehensive Plan Policies and Goals

Comprehensive Plan Element	Goal/Policy
Parks, Recreation, Open Space, and Historic Preservation	Goal 5: Achieve balance among economic uses of land and critical areas protection.
Parks, Recreation, Open Space, and Historic Preservation	Goal 5 Policy 1: Work with state, federal, and local agencies and other County stakeholders regarding the application of environmental protection laws and regulations.
Utilities Element	Goal 2: Maintain public and private household water and sewer systems that are consistent with the rural character of the County.
Utilities Element	Goal 3: Facilitate efficiency in utility land use and development.
Utilities Element	Goal 3 Policy 2: Encourage multiple uses, including passive recreational use, in utility corridors where practical.
Utilities Element	Goal 3 Policy 3: Facilitate maintenance and rehabilitation of existing utility systems and facilities and encourage the use of existing transmission/distribution corridors.

Source: Benton County 2021a
CAO = Critical Areas Ordinance; GMA = Growth Management Act; SMP = Shoreline Management Program;
SEPA = Washington State Environmental Protection Act; UGA = Urban Growth Area

This Page Intentionally Left Blank

3.9 Historic and Cultural Resources

This section describes documented historic and cultural resources for the proposed Horse Heaven Wind Farm (Project, or Proposed Action) vicinity. Section 4.9 presents an analysis of the Project's potential impacts on historic and cultural resources. The Project Lease Boundary is situated within the Horse Heaven Hills and comprises 72,428 acres of land approximately 4 miles south-southwest of Kennewick and the Tri-Cities urban area, alongside the Columbia River in Benton County, Washington. The Area of Analysis for historic and cultural resources is the proposed Project footprint and comprises the proposed Wind Energy Micrositing Corridor of approximately 10,972 acres (of predominantly linear features including the turbines, support infrastructure, etc.) and the Solar Siting Areas, which encompass approximately 10,755 acres.

Background

Historic and cultural resources include locations of past human activities, sites of occupation, and sites of usage that contain tangible materials (archaeological artifacts or single "isolates") or structural components (historic sites). They may also include landscapes used, built, or modified by people and associated with a specific ethnic or tribal group for longstanding cultural purposes, entwined with belief systems that may not continue to the present. For the purposes of this impact assessment, historic and cultural resources for the Project are more specifically defined as follows:

- **Archaeological Resources:** According to Washington Administrative Code (WAC) 25-48-020(10), archaeological resources are, "any material remains of human life or activities which are of archaeological interest, including all sites, objects, structures, artifacts, implements, and locations of prehistorical or archaeological interest, whether previously recorded or still unrecognized." Archaeological resources include precontact and historic-period sites.
  - Precontact period archaeological resources include lithics (modified stone artifacts—e.g., bifaces, flake tools, projectile points, cores, and debitage); groundstones produced by grinding food (e.g., pestle and mortar); camps (short-term occupation sites); villages (clusters of dwellings); house pits (dwellings partially dug into the ground); trails associated with significant destinations (routes or pathways); cairns or rock piles that may mark a burial or other feature; and burials containing human remains and funerary objects (DAHP 2003).
  - Historic-period archaeological resources include homesteads, debris scatter, townsites, roads, cemeteries, religious property, and agricultural features (DAHP 2003).
- **Historic Archaeological Resources:** These are properties that are listed in or eligible for listing in the Washington State Register of Historic Places (Revised Code of Washington [RCW] 27.34.220) or the National Register of Historic Places (NRHP), per WAC 25-48-020(11). Historic properties are typically 50 years of age or older (Wilkerson et al. 2004). They can include archaeological sites, architectural resources, and traditional cultural properties (TCPs).
- **Architectural Resources:** These include extant elements of the built environment, such as buildings, structures, sites, districts, and objects. Architectural resources are distinct from historic features that are in ruin (DAHP 2022). For the Lease Boundary, these may include farmsteads and associated structures (e.g., grain towers) and roads, railways, or other historic-period infrastructure (e.g., transmission lines).
- **Traditional Cultural Properties:** TCPs include features of tribal significance and cultural and/or religious importance and may present as natural features entwined with cultural values. A TCP, broadly defined by the

Washington State Department of Archaeology and Historic Preservation (DAHP), may be “a distinctive natural site, such as a mountaintop, or a historic environment, such as an ethnic neighborhood, or it may simply be a place with significant historic value to a specific ethnic or cultural group…based upon historic cultural beliefs, customs, or practices which may or may not continue to the present” (Wilkerson et al. 2004). A TCP may also include a viewshed and associated landscape elements. Examples of TCPs (as adapted from the National Register Bulletin 38) include:

- A significant location associated with the traditional beliefs of a tribe in relation to its origin or cultural belief system
- A long-term, rural community whose land usage reflects longstanding cultural traditions
- An urban neighborhood that is the traditional home of a particular cultural group and that reflects its beliefs and practices
- A location where religious practitioners have historically gone, and are known to go today, to perform ceremonial activities in accordance with traditional cultural rules of practice
- A place where a community has traditionally carried out economic, artistic, or other cultural practices important in maintaining its historic identity (NPS 1992)

Methodology

Horse Heaven Wind Farm, LLC’s (the Applicant’s) consultant, Historic Research Associates, Inc. (HRA), completed several cultural resources studies for the Project during 2020 and 2021 to identify historic and cultural resources (including cultural landscape elements) (Davis, Burk-Hise, and Henderson 2020; Davis and Ragsdale 2020, 2021; Davis, Jones, et al. 2021; Davis, Tuck, et al. 2021). These included archival and records research, archaeological survey (pedestrian field survey), and architectural survey. In addition, HRA conducted tribal outreach, which consisted of requesting information via phone call, letter, and email from affected Tribes (the Confederated Tribes and Bands of the Yakama Nation [Yakama Nation], Confederated Tribes of the Umatilla Indian Reservation [CTUIR], the Nez Perce Tribe [Nez Perce], and the Wanapum Tribe) concerning the Project’s Area of Analysis. By definition, formal government-to-government tribal consultation is not within the purview of Horse Heaven Wind Farm, LLC, or its cultural resources consultant, and none of HRA’s tribal outreach activities should be considered consultation that fulfills government agency responsibilities to consult under federal or state cultural resource regulations.

Cultural resources studies, including those conducted by HRA for the Project in 2020 and 2021, employ a variety of investigative techniques to identify cultural resources. Archaeological methods used for resource identification include visual surface inspection (pedestrian survey) and subsurface testing (shovel testing). It should be noted that no archaeological technique is wholly comprehensive. Archaeological methods rely on sampling that can produce a bias in results. Systematic pedestrian surveys and subsurface testing are designed to limit bias and increase the amount of area surveyed. Nonetheless, biased results can still arise due to differences in how materials are preserved over time, unintentional preferences for the types of cultural resources that are identified, and the ease of access to some cultural resources over others.

Prior to the commencement of the pedestrian survey phases, HRA reviewed the Lease Boundary and the available Project description to refine areas to be targeted for pedestrian field surveys (within the Area of Analysis). This included a review of local geomorphological and hydrological conditions; the precontact, ethnographic, and historic contexts of the landscape; previously recorded cultural resources; and the likelihood that recent disturbance has impacted cultural resources (e.g., through agriculture and construction activities). HRA also considered the predictive model developed by DAHP, which uses environmental variables to create areas of high, moderate, and low potential for cultural resources (Kauhi and Markert 2009). DAHP's statewide predictive model maps much of the Lease Boundary as Low Risk. However, there are several limited areas shown as Low to Moderate, Moderate, or High Risk, particularly along the periphery of the Lease Boundary to the northeast and northwest (Davis, Tuck, et al. 2021). High Risk areas are considered the most archaeologically sensitive, with a higher potential for identifying archaeological sites during the course of development (Kauhi and Markert 2009).

It should be noted that the DAHP predictive model is based on a number of variables, including elevation, level landforms, and proximity to water. For this reason, the settings for certain cultural resource types, such as rock cairns and talus features that are found on slopes far from water resources, are not captured as High Risk areas by the predictive model. As with sampling limitations of archaeological methods, discussed above, the DAHP predictive model cannot predict the location or existence of all cultural resource types. Neither the predictive model nor the archaeological methods should be interpreted as the definitive way to identify the presence of cultural resources within the Project Area of Analysis.

Informed by the results of the initial archival research dialogue with the affected Tribes, HRA conducted targeted pedestrian surveys within the Area of Analysis (Davis, Burk-Hise, and Henderson 2020; Davis and Ragsdale 2020; Davis, Jones, et al. 2021). The coverage of these pedestrian surveys is the Lease Boundary. These field investigations involved systematic pedestrian survey along transects spaced at 66-foot (20-meter) intervals (Davis, Jones, et al. 2021). Where features of historic and cultural interest were identified, more intensive survey and inspection was conducted to delineate the resource boundaries and record artifacts and/or features where present. The sites identified during HRA's pedestrian survey are summarized in Section 3.9.2. Approximately 122 acres (less than 1 percent) of the area targeted during the pedestrian survey were not accessible; this included lands that were too steep or had restricted access. These locations were areas of limited archaeological potential, and no additional surveys were recommended. Five unpublished, confidential reports detail the results of these studies on Washington State Department of Natural Resources (DNR) land (Davis, Burk-Hise, and Henderson 2020; Davis and Ragsdale 2020, 2021) and private land (Davis, Jones, et al. 2021; Davis, Tuck, et al. 2021). Davis, Jones, et al. (2021) is a finalized report for cultural resources surveys on private land and replaces an earlier draft (Davis, Jones, et al. 2020).

HRA completed its cultural resources investigations of the Project Area of Analysis in April 2021 (Davis and Ragsdale 2021; Davis, Tuck, et al. 2021). In total, HRA recorded 41 archaeological resources, including 29 sites and 12 isolates (Davis, Tuck, et al. 2021, p. ii). Ten isolates and two sites date to the historic period and have been recommended as not eligible for the NRHP (Davis, Jones, et al. 2021; Davis, Tuck, et al. 2021). Two isolates date to the precontact period. The remaining 27 archaeological sites are unevaluated for the NRHP (Davis, Tuck, et al. 2021, p.ii).

RCW 27.53.060 (Archaeological Sites and Resources) states that a DAHP permit may be required in the event of archaeological resource alteration/disturbance on private or public land. All precontact period sites and multi-component sites with precontact cultural materials require DAHP-issued permits prior to any disturbance, regardless of their NRHP eligibility. As such, all precontact sites are protected by RCW 27.53. A permit is required for any disturbance to historic-era sites that are eligible for listing on national, state, or local registers.

Shovel testing at two precontact isolates (**45BN2146** and **45BN2092**) within the Area of Analysis confirmed these resources as isolated finds, Although RCW 27.53.060 does not protect isolates, the Yakama Nation has requested avoidance of this find. Consultation between the Energy Facility Site Evaluation Council (EFSEC), DAHP, and Tribes is recommended in the event of unavoidable impacts to precontact isolates.

Davis, Tuck, et al. (2021, p. ii) report that two precontact sites (**45BN261** and **45BN2090**) and one precontact component at Site **45BN2153** are located within the Area of Analysis. For these three precontact resources, NRHP evaluation is not appropriate under the applicable regulatory context. Consultation between EFSEC, DAHP, and Tribes, and a DAHP permit would be necessary in the event of unavoidable impacts to precontact sites.

The Proposed Action plans to avoid the 24 historic-period sites and historic-period components (Davis, Tuck, et al. 2021, p. ii). If the 24 historic-period resources cannot be avoided, archaeological investigations (completed under a permit issued under RCW 27.53.060) would be necessary to evaluate their significance and integrity under the NRHP, to assess potential Project impacts, and/or to develop appropriate treatment measures. Consultation between EFSEC, DAHP, and Tribes may be necessary in lieu of, or in conjunction with, archaeological investigation.

To be eligible for the NRHP, cultural resources must be significant under one or more of the following criteria, as defined in the National Historic Preservation Act of 1966, as amended. Recommendations for eligibility for listing a resource in the NRHP are based on the following criteria codified in Title 36 Code of Federal Regulations Part 60.4, which states that resources are eligible:

> *A. That are associated with events that have made a significant contribution to the broad patterns of our history; or*
>
> *B. That are associated with the lives of persons significant in the past; or*
>
> *C. That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic value, or that represent a significant or distinguishable entity whose components may lack individual distinction; or*
>
> *D. That have yielded, or are likely to yield, information important in prehistory or history.*

In addition to being found significant under at least one of the criteria listed above, a resource also must possess integrity to be eligible for listing in the NRHP (NPS 1997; Hardesty and Little 2000). Integrity is assessed after a property's significance is evaluated and includes seven aspects: location, design, setting, materials, workmanship, feeling, and association (NPS 1997).

RCW 27-44.040(1) (Indian Graves and Records) states, "Any person who knowingly removes, mutilates, defaces, injures, or destroys any cairn or grave of any native Indian, or any glyptic or painted record of any tribe or peoples is guilty of a class C felony." Further, RCW 27-44.040(2) mandates that inadvertent grave disturbance through construction or other activities requires re-interment under supervision of the appropriate Indian tribe.

3.9.1 Affected Environment

This section summarizes the historic and cultural context applicable to the Area of Analysis and surrounding Lease Boundary. The cultural chronology of the region is broadly characterized by changing settlement patterns and subsistence strategies, evidenced in material cultural remains from the precontact period through the historic period.

3.9.1.1 Precontact Background

The Project would be located in the Columbia Basin physiographic province, comprising the south-central portion of the larger Columbia Plateau (Plateau) that encompasses much of the Pacific Northwest region. The chronological sequence of precontact history in the Lease Boundary includes the Palaeoarchaic period (pre-11,000 to 8000 before present [B.P.[12]]), Early Archaic period (8000 to 5000 B.P.), Middle Archaic period (5000 to 2000 B.P.), and Late Archaic period (2000 to 250 B.P.). Precontact resources are protected by the RCW (see Section 3.9.1). These chronological sequences are summarized below.

Palaeoarchaic Period

This period is represented by diagnostic lithic tools. In the Columbia Basin region, these are primarily associated with either the Western Clovis Complex (defined as a projectile with a prominent "flute" or flake scar at its base) or the Western Stemmed Tradition (large lanceolate, stemmed and shouldered bifaces) (Davis, Burk-Hise, and Henderson 2020). The socioeconomic structure of Palaeoarchaic people of the interior Plateau was likely centered around a mobilized subsistence strategy, including fishing, gathering, and hunting of large game.

Early Archaic Period

This period is largely represented by a greater variety of projectile point artifacts (including dart points, leaf-shaped or lanceolate Cascade Points, bone needles, harpoons, and awls). Cobble choppers, bola stones, beads, multi-faced burins, milling stones (manos), and knives (including ovate bifaces, crescents, and scrapers) are also associated and reflective of developing technologies in support of highly mobilized (and seasonal) hunter-gatherer groups, exploiting an increasingly wider resource base.

Middle Archaic Period

This period is represented by shell beads, hopper mortars, pestles, and an absence of cores and edge-ground cobbles, reflective of increased sedentism (i.e., living in one place for an extended time) and trading opportunities. During this transitional period, habitation sites become larger, located near locations with dense and reliable subsistence resources, with more intensive food processing and storage mechanisms (Hicks and Morgenstein 1994; Ames et al. 1998; as cited in Davis, Jones, et al. 2021).

Late Archaic Period

This period is represented by cobble tools, fishing equipment (net weights and composite harpoons), and mortars and pestles, but relatively low frequencies of projectile points. Pithouses provide evidence of widespread sedentism and social stratification, with an increasing reliance on riverine resources observed through the faunal assemblage and land use pattern in the region.

3.9.1.2 Ethnographic Background

As described, the Horse Heaven Hills and surrounding region have long been inhabited, with the hills and watercourses providing natural boundaries between distinctive tribal groups. The exact customary and ancestral boundaries of Indigenous groups, however, are not always clearly defined, with neighboring groups utilizing the landscape within the Project vicinity for hunting, fishing, gathering, and longstanding cultural purposes.

Among the many tribal groups that utilized the Project vicinity historically are the Yakama, Umatilla, Cayuse, Walla Walla, and Nez Perce Tribes, who spoke various dialects of the Sahaptin language-group (Davis, Burk-

[12] Before present, with present set at 1950 by convention.

Hise, and Henderson 2020). Due to their geographic location, the Yakama, Umatilla, Walla Walla, Cayuse, and Nez Perce resided in the center of a great trade network for thousands of years, stretching from the Pacific Ocean to the Great Plains, and south to the Great Basin. Like most Plateau and Columbia Basin groups, the Umatilla, Walla Walla, Cayuse, Yakama, and Nez Perce hunted terrestrial game, fished from the rich waterways, and gathered both edible and medicinal plants on a seasonal round basis. The introduction of the horse transformed the interactions of many Indigenous groups in the Plateau area. As trading grounds became more accessible and trading more regular, the traditional seasonal round was gradually altered. “For example, the Walla Walla, Cayuse, Yakama, and Umatilla, who had only occasionally ventured into the Great Plains, began to join Nez Perce hunting parties to the east” (Haines 1970, p. 61; Stern 1998; Walker 1998; as cited in Davis, Jones, et al. 2021).

Ethnographic research has identified several places within the Area of Analysis and its vicinity that have been associated with the Yakama, Umatilla, Cayuse, Walla Walla, and Nez Perce Tribes. These places include riverine village sites, fishing locations, and areas where groups gathered to trade and socialize. Native communities also identified significant places that could be used for grazing horses, resource gathering, and wayfinding by means of prominent landscape features. The names of significant places often describe important past events or communicate information about resources or dangers associated with certain areas (Davis, Jones, et al. 2021).

3.9.1.3 Recent Historic Background

The Horse Heaven range is referenced in William Clark’s journal of 1805, when the Lewis and Clark expedition moved into the region, camping near the confluence of the Snake and Columbia Rivers (Davis, Burk-Hise, and Henderson 2020). Early European settlement in the Washington area was primarily driven by the expansion of the fur trade, with the first wave of emigrants journeying across the Oregon Trail in the 1840s. In the mid-19th century, non-native settlements were further developed through the arrival of Presbyterian missionaries, continuing into the 1880s.

The impact of these newly arrived emigrants on the Indigenous population and their settlement of Native American land was a cause of tension, resulting in U.S. government-prepared treaties to provide land for consolidated tribal populations and expand the areas of non-native settlement. Treaty negotiations between the United States and the Plateau tribes took place at Camp Stevens in 1855. In the Treaty of June 9, 1855, the Cayuse, Umatilla, and Walla Walla ceded 6.4 million acres of land (including the entirety of the land included in the Lease Boundary) and reserved about 500,000 acres on which to live (Davis, Burk-Hise, and Henderson 2020). The Treaty with the Yakama Nation was also signed on June 9, 1855 (ratified March 8, 1859), ceding nearly 11 million acres of land.

The Nez Perce Tribe signed a treaty on June 11, 1855, that reduced their territory from 13 million acres to a 7-million-acre reservation. Another treaty with the Nez Perce in 1863 (at Lapwai, Idaho) further reduced the reservation to 757,000 acres. The Lapwai Treaty became known as the “thief” or “steal” treaty, creating animosity that eventually led to armed clashes between the Nez Perce and U.S. Army in 1877 (NPS 2020). Reserved lands were nevertheless opened for nonnative settlement in 1895 and this, along with other factors, including the discovery of gold, reduced Nez Perce land further to less than 100,000 acres by the late 19th century. As part of these treaty agreements, the tribes agreed to relinquish title to their lands while maintaining their traditional rights to hunt, fish, gather roots and berries, and pasture their animals on lands outside reservation land (Lahren 1998, p. 488; Schuster 1998, p. 343; as cited in Davis, Burk-Hise, and Henderson 2020). Tribal access to public lands under treaties is a complex issue; the maintenance of continued safe access to cultural sites (during Project activities) is considered in Chapter 4.9.

Nonnative settlers also had devastating impacts on the local tribal population in the Columbia River valley area through the transmission of new diseases that wiped out many of the elder tribe members more susceptible to illness; with their demise, links to traditional cultural practices were severed. Spurred by the lack of treaty enforcement (and treaty violations), native groups throughout the Plateau region began to fight against outside intrusion, resulting in the Indian Wars of 1855 to 1858 (Beckham 1998; Hunn 1990; as cited in Davis, Jones, et al. 2021). Conflicts between native people, settlers, and the U.S. government lasted until the 1870s in the American West and were confined, for the most part, to the years 1855 to 1858 in the area comprising the Project vicinity (Davis, Burk-Hise, and Henderson 2020).

In the mid-19th century, low cattle stock prices meant that ranching was unprofitable, and tribal conflict was high. The development of the Northern Pacific railroad, however, from the Midwest to the Pacific Ocean in the 1870s, opened the area up to more intensive emigration, and the population increased rapidly through to the end of the century (Davis, Burk-Hise, and Henderson 2020). Agriculture, irrigation, and infrastructure services were developed in support of the growing farming community. A number of related features, including farmsteads, farm equipment, and a grain tower, have been located in the Area of Analysis. In 1937, the Bonneville Power Administration (BPA) was created, and public power was provided to residents in the Pacific Northwest. Two BPA transmission lines extend a survey area built in 1948 (altered to its current alignment in 1975), and another survey area built in 1955 (Brannan and Clark 2007, as cited in Davis, Burk-Hise, and Henderson 2020). In the mid- to late 20th century, nonnative settlement increased dramatically in the region, in response to the development of the Hanford nuclear facility. The nuclear production site was built in 1944, comprising nine former plutonium reactors in the vicinity of Hanford, a small farming community. People from all over the United States came to Hanford, forming a 51,000-person workforce (U.S. Department of Energy 2022). The reactors ceased in 1987, with large scale land remediation ongoing to the present day (U.S. Department of Energy 2022).

3.9.1.4 Applicant Communications with Tribes and Agencies

Table 1.12-2 in the Horse Heaven Wind Farm Application for Site Certification (ASC) identifies the dates, participants, and topics discussed during Applicant outreach to Tribes and applicable agencies (Horse Heaven Wind Farm, LLC 2021). All communications between the Applicant, Tribes, and agencies pre-date the submission of the ASC, which was submitted in February 2021. Formal government-to-government consultation between EFSEC and the Tribes and other government agencies has not been initiated. Informal staff-to-staff communication began on March 9, 2021, with a notice of public meeting sent to the Tribes.

Applicant outreach to the Tribes began in 2018 by Scout Clean Energy LLC (Scout), the indirect owner of 100 percent of Horse Heaven Wind Farm, LLC. Communication with DAHP began in 2019. **Table 3.9-1** is adapted from the ASC (Horse Heaven Wind Farm, LLC 2021, Table 1.12-1) and outlines tribal outreach and agency communication conducted by the Applicant for the Project.

Table 3.9-1: Applicant Outreach and Communication to Tribes and Agencies for Horse Heaven Wind Farm Project

Date	Tribe(s)/Agency Contacted	Nature of Communication and Participants(a)	Topics Discussed
6/1/2018	Yakama Nation	Letter from Snyder/Scout to Lally/Yakama	Project Introduction.
7/27/2018	Yakama Nation	Email exchange between Lally/Yakama and Snyder/Scout	Project information request and follow up.
8/9/2018	Yakama Nation	Meeting between Snyder/Scout and Lally, Meninick/Yakama	Project status, tribal approach to impact avoidance, areas of concern to Yakama.
9/12/2018	Yakama Nation	Meeting between Penry, Snyder/Scout and Lally, Meninick/Yakama	Project status updates, tribal approach, Scout staff transition.
1/14/2019	Yakama Nation	Phone call between T Ozbun/AINW (on behalf of Scout) and Lally/Yakama	Discuss approach to surveys and areas of concern to Yakama.
1/18/2019	Yakama Nation	Transmittal of Draft Record Search and Literature Review to Lally/Yakama	Request comment from the Yakama.
2/22/2019	Yakama Nation	Email exchange between Lally/Yakama, Kobus/Scout, Lawson/Tetra Tech, Ozbun/AINW	Provide status of permitting and agency contacts.
2/25/2019	Yakama Nation	Emailed letter from Meninick/Yakama to Kobus/Scout	Provide comments on preliminary record search.
9/3/2019	DAHP	Meeting between Kobus/Scout, Wardlaw and Hanson/DAHP, and Lawson/Tetra Tech	Provide scope and approach for cultural studies and applicable regulations at the Project site.
2/5/2020	Yakama Nation, CTUIR, Nez Perce, Wanapum	Letters and phone calls from Applicant cultural consultant, Ragsdale/HRA, to Yakama, CTUIR, Nez Perce, and the Wanapum Tribe	Describe updated Project and offer opportunity to participate in site surveys and provide information on resources to be assessed.
5/1/2020 to 5/12/2020	Yakama Nation	Emails from Ragsdale/HRA to Lally/Yakama	Request comments on archaeological survey report for DNR lands.
5/5/2020	Yakama Nation, CTUIR, Nez Perce	Transmittal of Draft Report to Baird/Nez Perce, CTUIR, and Lally/Yakama	Results of the survey on private lands provided to the Tribes in the form of a draft report.
5/14/2020	Yakama Nation, CTUIR, Nez Perce, Wanapum, DAHP	Transmittal of Final Report to Lally/Yakama, CTUIR, Baird/Nez Perce, Buck/Wanapum, Unland/DNR, and Hanson/DAHP	Submitted the final archaeological survey report for DNR lands.

Table 3.9-1: Applicant Outreach and Communication to Tribes and Agencies for Horse Heaven Wind Farm Project

Date	Tribe(s)/Agency Contacted	Nature of Communication and Participants(a)	Topics Discussed
5/26/2020	DAHP	Email between Hanson/DAHP and Wendt/County	DAHP letter of concurrence on HRA's recommendations in the DNR survey report.
5/26/2020	Nez Perce	Email between Ragsdale/HRA and Baird-Williamson/Nez Perce	Offer for CTUIR to complete a TCP study, offer to give a presentation of the Project via a virtual meeting.
5/28/2020 – 7/6/2020	CTUIR	Emails between Ragsdale/HRA and CTUIR	Invite participation in upcoming surveys.
7/6/2020 – 7/8/2020	Yakama Nation	Phone calls and emails between Ragsdale/HRA and Lally/Yakama	Invite participation in upcoming surveys.
8/12/2020	Yakama Nation, CTUIR, Nez Perce	Email between Ragsdale/HRA, Lally/Yakama, CTUIR, and Baird/Nez Perce	Provide an update on the status of resources identified during surveys, as well as to inform the Tribes of an additional survey planned in late August/early September 2020.
8/28/2020	CTUIR	Emails between Ragsdale/HRA and CTUIR	Invite participation in upcoming surveys.
9/29/2020	CTUIR	Phone call between Ragsdale/HRA and CTUIR	Update regarding the status of the upcoming survey reports (for work on private land and DNR land); discussion of precontact resources identified in the private lands report.
10/16/20	Yakama Nation, CTUIR, Nez Perce	Transmittal of Draft Report to Lally/Yakama, CTUIR, and Baird/Nez Perce	Draft report for review and comment provided to the Tribes.
10/19/2020	CTUIR	Email from Steinmetz/CTUIR to Ragsdale/HRA	Comments on private lands report.
10/12/2020 to 10/28/2020	CTUIR	Emails from Ragsdale/HRA and CTUIR	Offer of a subcontract crew position for the upcoming pedestrian cultural surveys.
10/30/2020	Yakama Nation, Nez Perce	Email from Ragsdale/HRA to Lally/Yakama and Baird/Nez Perce	Notification of upcoming survey of the solar parcels.
10/19/2020	Yakama Nation	Email from Lally/Yakama to Ragsdale/HRA	Comments on private lands report.

Table 3.9-1: Applicant Outreach and Communication to Tribes and Agencies for Horse Heaven Wind Farm Project

Date	Tribe(s)/Agency Contacted	Nature of Communication and Participants(a)	Topics Discussed
11/20/2020	CTUIR, Nez Perce	Email from Ragsdale/HRA to CTUIR and Baird/Nez Perce	Notification that surveys of a portion of the solar parcels have been completed; overview of the resources identified during the surveys provided.

Source: adapted from Horse Heaven Wind Farm, LLC 2021, Table 1.12-2
Notes:
[a] See Horse Heaven Wind Farm, LLC (2021) for more information on participants.
AINW = Archaeological Investigations Northwest, Inc.; CTUIR = Confederated Tribes of the Umatilla Indian Reservation; DAHP = Washington State Department of Archaeology and Historic Preservation; DNR = Washington State Department of Natural Resources; HRA = Historical Research Associates, Inc.; Nez Perce = Nez Perce Tribe; Scout = Scout Clean Energy LLC; Tribes = Confederated Tribes and Bands of the Yakama Nation, Confederated Tribes of the Umatilla Indian Reservation, Nez Perce Tribe, and the Wanapum Tribe; Yakama = Confederated Tribes and Bands of the Yakama Nation

3.9.1.5 Previous Surveys within the Lease Boundary

Given the large geographic extent of the Lease Boundary, very little of the area has been subject to historic and cultural resources survey prior to HRA's investigations in relation to the Project in 2020 and 2021 (Davis, Burk-Hise, and Henderson 2020; Davis and Ragsdale 2020). Twenty-seven cultural resource studies have been conducted within the Lease Boundary. These surveys were identified through a review of records maintained by DAHP in the Washington Information System for Architectural and Archaeological Records Data (WISAARD); the resources identified by these previous surveys are summarized in **Table 3.9-2**. These include nine previously identified historic sites and one precontact site. Four of these sites are within the Area of Analysis and subject to survey: three historic-period architectural resources (two transmission lines and one roadway) and one precontact archaeological site (**45BN261**). The four resources located within the Area of Analysis (i.e., proposed Project footprint) are discussed in Section 3.9.2.

Table 3.9-2: Previously Identified Resources within the Project Lease Boundary

ID # or Site #	Type	NRHP Eligibility[a,b]
45BN261	Archaeological Precontact	Not evaluated Protected under RCW
12851	Archaeological Historic	Not evaluated
12852	Archaeological/Architectural Historic	Not evaluated
12977 (45BN1497)	Archaeological Historic	Not evaluated
575328	Architectural Historic	Not evaluated
667226	Architectural Historic	Eligible
667765	Architectural Historic	Not eligible
721665	Architectural Historic	Not eligible

Table 3.9-2: Previously Identified Resources within the Project Lease Boundary

ID # or Site #	Type	NRHP Eligibility[a,b]
721666	Architectural Historic	Eligible
45BN205	Archaeological Historic	Not evaluated

Sources: Davis, Jones, et al. 2021; Davis, Tuck, et al. 2021
Notes:
[a] "not evaluated" = not evaluated and potentially eligible for NRHP listing
[b] unevaluated resources would be avoided by the Project, or, if avoidance is not possible they would be evaluated in accordance with guidelines provided by DAHP.
N/A = not applicable; NRHP = National Register of Historic Places; RCW = Revised Code of Washington

3.9.2 Historic and Cultural Resources Identified

The pedestrian survey, limited to the proposed Project design (the Area of Analysis), was undertaken by HRA during 2020 and supplemented in 2021 (to cover additional survey areas not previously accessible) (Davis, Burk-Hise, and Henderson 2020; Davis and Ragsdale 2020, 2021; Davis, Jones, et al. 2021; Davis, Tuck, et al. 2021). Within the Area of Analysis (including both the private land and land owned by DNR), 44 new resources were identified, in addition to the four identified from previous studies (Section 3.9.2.5). Forty of these new sites are archaeological, and three are architectural. One new site is mixed, with both architectural and archaeological components. The resources were found to be concentrated primarily in the western and central-eastern parts of the Lease Boundary and are summarized below according to their type (archaeological or architectural) and period (precontact or historic). All identified sites are summarized below and listed in **Table 3.9-3.**

3.9.2.1 Archaeological Resources

Precontact Period

Five precontact period resources, including two archaeological sites and three isolates, have been identified in the Area of Analysis for the Project (including site **45BN261**, recorded previously). These are discussed according to their survey area below and summarized in **Table 3.9-3**. Precontact sites **45BN261** and **45BN2090** were documented during the pedestrian survey. Precontact isolates **45BN2092** and **45BN2146** were identified through shovel testing. Multi-component site **45BN2153** was identified through pedestrian survey and includes both precontact and historic cultural materials; the site is unevaluated for the NRHP (Davis, Burk-Hise, and Henderson 2020; Davis and Ragsdale 2020, 2021; Davis, Jones, et al. 2021; Davis, Tuck, et al. 2021).

Western Survey Area

The pedestrian survey of the Western survey area, including Webber Canyon, identified four precontact era resources. The westernmost precontact resource is an isolate, **45BN2146**, a single projectile point of white crypto-crystalline silicate (CCS), consistent with a small Columbia Stemmed typology that post-dates 110 B.P. in the region, associated with the Cayuse Phase (Leonhardy and Rice 1970, as cited in Davis, Tuck, et al. 2021, p.107). Radial shovel probes confirmed the isolated nature of the find. Verified as an isolated artifact, the resource is not protected by RCW 27.53 (Davis, Tuck, et al. 2021, p.107).

The second precontact period resource in the survey area is isolate **45BN2092**. The proximal fragment of a CCS broad-necked, corner-notched projectile point was located in a wheat field, on the slope of a ridgeline. The morphology and neck width are consistent with Madras Shouldered lithic assemblages, which do not have a well-defined temporal range but likely predate 2000 B.P. on the Columbia Plateau (Davis, Tuck, et al. 2021, p. 56).

Radial shovel probes, recommended by the Yakama Nation (Horse Heaven Wind Farm, LLC 2021, pp. 4–117), confirmed the isolated nature of the find (Davis, Jones, et al. 2021, p.58).

Precontact site **45BN261** was originally recorded in 1980 and revisited in 2007 and 2013 (Davis, Jones, et al. 2021). The location of **45BN261** was verified during HRA's pedestrian survey in 2021. It is HRA's interpretation that over the last decade, the cultural features at site **45BN261** have been altered in multiple ways, including road construction and maintenance, and disturbance by bikers, hikers, horseback riders, and all-terrain vehicles, involving the displacement of rocks within the features. The Yakama Nation indicated that the precontact site is directly associated with a TCP (Davis, Jones, et al. 2021, p. 4). The site remains unevaluated for NRHP eligibility, but, as a precontact feature, it is currently protected under RCW 27.53 regardless.

A multi-component site, **45BN2153**, was located during the field survey. The site is situated in a planted wheat field and includes an isolated precontact artifact that was recovered near the center of the site. It is unknown if additional subsurface precontact artifacts are present (excavations within the site would require a permit from DAHP).

Eastern Survey Area

One precontact resource, **45BN2090**, was identified during the pedestrian survey of the Eastern survey area. As a precontact site, and prior to further evaluation, it is protected under RCW 27.53, which declares that the public has an interest in conserving, preserving, and protecting archaeological resources (which includes unevaluated precontact sites regardless of their NRHP eligibility).

Historic Period

Thirty-seven historic-period archaeological resources have been identified in the Area of Analysis during the pedestrian survey phase, comprising 27 historic sites and 10 isolates (Davis, Burk-Hise, and Henderson 2020; Davis and Ragsdale 2020, 2021; Davis, Jones, et al. 2021; Davis, Tuck, et al. 2021). These are discussed according to each survey area below and summarized in **Table 3.9-3**.

The majority (n=18) of the historic-period archaeological sites consist of a variety of surface artifacts associated with late 19th- and early 20th-century agricultural activity. Upon locating these sites, HRA mapped their extent and assessed the potential for any subsurface remains while considering the type and density of the surface material and their likely association with any earlier structures (e.g., 19th-century homesteads visible on historic mapping and/or aerial imagery). The historic archaeological sites identified in the Area of Analysis include farmstead remains, field stones, agricultural equipment, historic refuse scatters, and historic infrastructure remains. Where a particularly high density of surface materials was observed by HRA, and where further research or historic mapping identified homesteads or other structures in their vicinity, further archaeological work prior to the evaluation of the site for listing in the NRHP has been recommended (Davis, Burk-Hise, and Henderson 2020; Davis and Ragsdale 2020, 2021; Davis, Jones, et al. 2021; Davis, Tuck, et al. 2021).

Single isolates were generally evaluated to have limited significance or potential for further additional information (e.g., isolated pieces of trash, removed from their wider context). These artifacts were recommended as not eligible for listing in the NRHP due to a failure to convey significance under any of the criteria, and a lack of integrity.

Western Survey Area

HRA documented 23 historic-period archaeological resources in the westernmost survey area (Davis, Burk-Hise, and Henderson 2020; Davis and Ragsdale 2020, 2021; Davis, Jones, et al. 2021; Davis, Tuck, et al. 2021). All features are listed in **Table 3.9-3**. Site **45BN2147** comprises a stack of cobblestones, likely removed from surrounding agricultural fields. Sites **45BN2159**, **45BN2160**, and **45BN2162** include a variety of 19th- and 20th-century surface artifacts (e.g., ceramics, glass, and metal), and site **45BN2161** comprises two combined harvesters (made between 1940 and 1960) at the edge of a harvested wheat field, alongside a wooden communication pole with a glass insulator. HRA evaluated the archaeological potential of each site location through historic map regression and documentary analysis. No development was observed in the immediate area of either **45BN2147** or **45BN2159**. There is, however, a small historic structure mapped in the vicinity of site **45BN2160** by 1917, subsequently demolished (USGS 1917, as cited in Davis, Tuck, et al. 2021, p. 140) and two buildings just south of location **45BN2161**, according to aerial images from 1955 and 1965 (HistoricAerials.com 1955, 1963; USGS 1965a; as cited in Davis, Tuck, et al. 2021). A structure appears at site **45BN2162** by 1915, demolished by 1955 (HistoricAerials.com 1955; USGS 1915, as cited in Davis and Ragsdale 2021:15). Further archaeological evaluation work is considered necessary to evaluate the eligibility of sites **45BN2147**, **45BN2159**, **45BN2160**, **45BN2161**, and **45BN2162** for listing in the NRHP.

The historic component of site **45BN2153** comprises a debris scatter, including fragmented and complete vessel glass, ceramic sherds, metal fragments, and ammunition hardware, totaling approximately 40 artifacts. The U.S. Geological Survey (USGS) map from 1917 depicts a structure in the same location as the site, demolished by 1953 (USGS 1917, as cited in Davis, Tuck, et al. 2021, p. 53). Further archaeological evaluation work is necessary to evaluate the eligibility of site **45BN2153** for listing in the NRHP.

Sites **45BN2151** and **45BN2152** are also historic period sites in the Western survey area. The former is the site of a building, visible today as partly buried foundations. No structures are depicted in this location on historic-period maps (GLO 1872; USGS 1917, 1953, 1965b; as cited in David and Ragsdale 2021). An aerial photograph from 1963, however, shows an intact structure, while another from 1996 shows it demolished (HistoricAerials.com 1963, 1996, as cited in Davis, Tuck, et al. 2021, p. 43). Site **45BN2151** could not be evaluated by HRA for listing in the NRHP without further archaeological investigations, though the structural remains appear to meet the 45-year threshold for consideration as an archaeological resource under the Washington State Environmental Policy Act (Davis, Tuck, et al. 2021, p. 43). Site **45BN2152** comprises a historic-period refuse dump, with artifacts that indicate several depositional events within the mid- to late 20th century. Reviews of historic maps and aerial imagery did not suggest the presence of any structures local to the site, and it was determined that the site could not be evaluated for listing in the NRHP without further archaeological investigation.

Site **45BN2084** is a historic-period isolate. As an isolate, site **45BN2084** was recommended by HRA as not eligible for listing in the NRHP due to a failure to convey significance under any of the criteria, and a lack of integrity.

Site **45BN2085** is a large historic debris scatter dating to the early 20th century. Site **45BN2085** cannot be considered for NRHP eligibility without further archaeological evaluation.

Sites **45BN2081** and **45BN2082** are historic isolates. The former is a single piece of farming equipment (possibly a tow-behind disc cultivator) and the latter, a single, fragmented earthenware vessel. Another isolate, **45BN2083**, a pull tab can (dating from the 1950s to 1970s), was found on the ground surface of a plowed field. All three isolates have been recommended not eligible for listing in the NRHP as they are representative of a single episode of discard, with limited potential for any associated subsurface deposits.

Site **45BN2093** consists of historic-period structural remains and artifacts. The remains of two residential structures are present, including the remains of two large outbuildings, numerous other foundations and features in ruin, and a scatter of historic-period artifacts. HRA determined that the site cannot be evaluated for listing in the NRHP without further archaeological investigation.

A historic-period debris scatter was recorded as site **45BN2086**, in a recently plowed field. The site comprises 119 surface artifacts, including a variety of colored glass over an area of 82 feet (25 meters) by 92 feet (28 meters). HRA determined that the site cannot be evaluated for listing in the NRHP without further archaeological investigation.

Site **45BN2144** is an isolate, a single glass vessel fragment, recommended not eligible for listing in the NRHP. Sites **45BN2143** and **45BN2145** are historic-period artifact scatters. The former includes dumped artifacts over an area of 295 feet (90 meters) by 148 feet (45 meters), including large items (farming equipment and vehicles), as well as smaller pieces (ceramic and glass). Historic maps show multiple structures within 1 mile (1.6 kilometers [km]) of Site **45BN2143** in 1915, but nothing in its immediate vicinity (USGS 1915, as cited in Davis, Tuck, et al. 2021, p. 96). The latter site, **45BN2145**, comprises surface artifacts in a recently plowed field, over a 394- by 262-foot (120- by 80-meter) area, and potentially associated with a homestead dating to 1907. HRA determined that neither site can be evaluated for listing in the NRHP without further archaeological investigation (Davis, Tuck, et al. 2021).

Site **45BN2149** includes a historic-period surface scatter over 131 by 164 feet (40 by 50 meters) totaling approximately 80 items (ceramic sherds, shotgun casing) indicative of a mid- to late-20th-century deposition. A USGS map from 1915 shows a structure in the same location as the site, demolished by 1955. HRA determined that the site cannot be evaluated for listing in the NRHP without further archaeological investigation. Sites **45BN2150** and **45BN2163** are historic-period isolates, a single ceramic sherd (**45BN2150**) and a colorless glass bottle found in seven pieces (**45BN2163**). Isolated finds of discarded trash, such as a broken bottle, are common in rural settings such as the Lease Boundary, and HRA determined that neither site is eligible for listing in the NRHP due to their failure to convey significance under any of the required criteria, and a lack of integrity (Davis, Tuck, et al. 2021).

Site **45BN2157** includes three historic-period artifacts (milk glass and ceramic) found in a harvested wheat field, potentially associated with site **45BN2158**, immediately to the east where over 200 items were recorded. Historic mapping does not show any buildings around site **45BN2157**, although a structure is depicted in nearly the same location as site **45BN2158** by 1915. HRA determined that neither site can be evaluated for listing in the NRHP without further archaeological investigation.

East-Central Survey Area

There are 12 historic-period archaeological sites in the East-Central survey area. All features are listed in **Table 3.9-3**. Sites **45BN205**, **45BN2139**, and **45BN2140** are surface scatter. Site **45BN205** was previously identified during the desk-based study, which recorded some structural remains (Randolph and Boreson 1975a, as cited in Davis, Jones, et al. 2021). Although large pieces of wagon debris were identified during the field survey, no structures were seen. Background research indicates that there was limited development in the vicinity of sites **45BN2139** and **45BN2140** in the late 19th and early 20th centuries. Site **45BN2139** was evaluated as not eligible for listing in the NRHP due to its low artifact density, while site **45BN2140** requires further evaluation in this regard.

A single amber glass fragment (**45BN2138**) appears to represent a single episode of discarded trash associated with agricultural or residential use, possibly in the late 19th or early 20th century. It may have been thrown out of a vehicle, as it was found adjacent to a roadway. The isolate is not eligible for listing in the NRHP due to a failure to convey significance under any of the criteria, and a lack of integrity.

Site **45BN2141** consists of a historic-period refuse scatter over a 213-foot (65-meter) by 82-foot (25-meter) area with an array of fragmented glass vessels (amber, aqua, colorless, green, milk (opaque white), and pink-colored fragments. Site **45BN2142** consists of two historic-period structural remains on a southeast-facing slope adjacent to an artificially flattened area, potentially a grain elevator and ramp/scale house. Historic maps show two structures approximately 0.3 miles (0.5 km) west of both sites (USGS 1917, as cited in Davis, Tuck, et al. 2021, p. 169). HRA determined that neither site can be evaluated for listing in the NRHP without further archaeological investigation (Davis, Tuck, et al. 2021).

Site **45BN2154** is a historic debris scatter located within an unnamed drainage. The site includes structural remains that likely represent a former grain elevator. Artifacts observed include automotive parts and metal containers for oil, weed killer, and paint. Historic mapping and aerial images show a structure in the vicinity of the site location by the mid-twentieth century (Davis, Tuck, et al. 2021, p. 176). HRA concluded that Site **45BN2154** cannot be evaluated for listing in the NRHP without further archaeological investigation (Davis, Tuck, et al. 2021).

Isolate **45BN2155** consists of an amethyst-colored glass fragment. Site **45BN2156** comprises two metal oil drums, one manufactured in 1945 and the other in 1951. Background research indicates little development in this area in the early to mid-20th century, with no mapped homesteads, plots of cultivated land, or structures in the site vicinity on maps from 1865 to 1964 (Davis, Tuck, et al. 2021). HRA recommended that neither the isolate (**45BN2155**) nor the site of the two oil drums (**45BN2156**) is eligible for listing in the NRHP due to their failure to convey significance under any of the required criteria, and a lack of integrity (Davis, Tuck, et al. 2021).

Site **45BN2148** is a multi-component site featuring archaeological surface scatter and historic-period architectural remains (discussed in Section 3.9.3). The archaeological component includes seven features in various states of ruin and some assorted debris. Three water cisterns set in concrete were noted, along with a root cellar, reinforced with automotive parts. Other elements include calf pens, other unidentifiable wooden structures in a collapsed state, and an intact pickup truck. Hundreds of modern shotgun casings, as well as modern trash (beer bottles, plastic bottles, and food containers), were also noted within the site vicinity. Reviews of aerial imagery and historic mapping suggest the farmstead was built in approximately 1920, and HRA determined that the archaeological component of the site cannot be evaluated for listing in the NRHP without further investigation.

Site **45BN2087** comprises a historic-period debris scatter located in a fallow wheat field east. A variety of surface artifacts were recorded, including glass, ceramic, brick, and metal, amounting to 63 pieces in total. Historic maps show a building located 0.1 miles (0.16 km) southwest of the site and a more clearly marked building 0.6 miles (1 km) to the southwest (Davis, Jones, et al. 2021, p. 142). It was determined that neither site can be evaluated for listing in the NRHP without further archaeological investigation.

Isolate **45BN2091** is a single, fragmented stoneware vessel (consisting of 10 sherds). Considering the nature of the isolated find, its location in a disturbed agricultural field, and the absence of significant historical development in the vicinity, it is not likely that significant deposits are present at the isolate location. Therefore, the isolate was recommended ineligible for listing in the NRHP.

Eastern Survey Area

There are two historic-period archaeological sites identified within the Eastern survey area, in the easternmost part of the Area of Analysis. The sites are similar, both comprising surface debris across a dispersed area. They remain unevaluated for the eligibility for listing in the NRHP without further archaeological investigation. Both features are listed in **Table 3.9-3**.

Site **45BN2088** consists of a surface scatter covering an approximate area of 98 by 98 feet (30 by 30 meters). Nineteen artifacts were recorded in total, including glass, some decorated ceramics, and metal pieces. The finds date to the mid-19th to early 20th century. Site **45BN2089** covers a slightly smaller footprint, with similar artifacts recovered, including some farming equipment and a metal tricycle, dated to the early 20th century. Reviews of historic mapping and aerial imagery did not directly associate either site with an earlier farmstead, though a building is mapped 0.5 miles (0.8 km) northwest of site **45BN2088** and 0.2 miles (0.3 km) south of site **45BN2089**, at the edge of a canyon in 1917 (Davis, Jones, et al. 2021).

3.9.3 Architectural Resources Identified During the Pedestrian Survey

A total of seven architectural resources were recorded during the pedestrian surveys across the Area of Analysis (Davis, Burk-Hise, and Henderson 2020; Davis and Ragsdale 2020, 2021; Davis, Jones, et al. 2021; Davis, Tuck, et al. 2021). These include three resources identified during previous studies of the area (as listed in Section 3.9.2.5). All features are listed in **Table 3.9-3**.

Historic architectural remains documented at Site **45BN2148** (Nicoson Road Farmstead) include a farmstead, built in approximately 1920. Many of the original buildings and structures on the farmstead, as pictured in historic mapping, are no longer extant, including a farmhouse, barn, and assorted outbuildings (USGS 1952a, 1963a, as cited in Davis, Tuck, et al. 2021, p. 75). The surviving cribbed grain elevator is an example of an early 20th-century type ubiquitous in the region; it has also lost some of its important components and is in a generally dilapidated condition. Davis, Jones, et al. (2021, p. 80) recommend that Site **45BN2148** is not significant under NRHP criteria A, B, or C. As such, the historic architectural features of Site **45BN2148** are recommended not eligible for the NRHP (Davis, Jones, et al. 2021, p. 80). As stated in Section 3.9.3.2, the archaeological potential of Site 45BN2148 under NRHP Criterion D remains unevaluated.

3.9.3.1 Western Survey Area

A single architectural resource, 17302 County Well Road, Prosser (DAHP Property ID: **724939**), was identified during the pedestrian survey of the Western survey area. A farmstead cluster comprising a residence (constructed in 1934), a detached garage, a shop, a machine shed, a grain elevator, and five grain storage silos/bins, surrounded by agricultural fields. Most of the buildings are noted to have sustained significant alterations, primarily in the 1980s and 2000s. HRA evaluated the resources both individually and as a collective farmstead, and, although no alterations were visible for either the grain elevator or storage silos (constructed between 1955 and 1963), they are considered to be a type ubiquitous across the region and lacking in distinctive characteristics. Consequently, the site was recommended not eligible for listing in the NRHP (Davis, Tuck, et al. 2021).

3.9.3.2 West-Central Survey Area

A multistorey grain elevator (DAHP Property ID **722995**) was recorded within the West-Central survey area. The elevator is clad in corrugated metal and was constructed around 1940. Analysis of historic maps has not associated the elevator with any nearby homestead, and, as it is built of common materials and of typical type and style, it was recommended not eligible for individual listing in the NRHP as it does not meet any NRHP criteria (Davis, Jones, et al. 2021, p. 130). WISAARD, Washington State's online database of architectural resources, lists the grain elevator (DAHP Property ID **722995**) as determined eligible as of November 19, 2021 (WISAARD 2022a).

3.9.3.3 East-Central Survey Area

The McNary–Pasco line is a 115-kilovolt (kV) transmission line that was originally constructed in approximately 1948 (Brannan and Clark 2007, as cited in Davis, Burk-Hise, and Henderson 2020). The line was rerouted in 1975 and passes through the East-Central survey area, in the central-eastern part of the Lease Boundary. Two portions of the line, McNary–Badger Canyon No. 1 Transmission Line (DAHP Property ID **721665**) and McNary–Franklin No. 2 Transmission Line (DAHP Property ID **721666**), were recorded in 2020 as within the Lease Boundary. McNary–Badger Canyon No. 1 Transmission Line (DAHP Property ID **721665**) was recommended not eligible for listing in the NRHP per the guidelines in the context of the Multiple Property Documentation (MPD) for the BPA Transmission System. DAHP concurred the eligibility recommendation in a letter dated May 26, 2020 (Horse Heaven Wind Farm, LLC 2021, pp. 4–110; see also WISAARD 2022b).

McNary–Franklin No. 2 Transmission Line, DAHP Property ID **721666**, runs parallel to the McNary–Badger Canyon No. 1 Transmission Line (DAHP Property ID **721665**), through the East-Central survey area. It is a 230-kV line, originally constructed in 1955 and energized in 1956. The transmission line was recommended eligible for listing in the NRHP under Criterion A because of its association with themes of commerce, engineering, industry, and government, and within the context of the MPD for the BPA Transmission System. DAHP concurred with the eligibility recommendation in a letter dated May 26, 2020 (Horse Heaven Wind Farm, LLC 2021, pp. 4–110; see also WISAARD 2022c).

A manufactured house, 147407 E. Beck Road (DAHP Property ID: **722996**), was identified in the East-Central survey area and comprised a modern Quonset hut and a residence (south of the roadway). Analysis of aerial imagery suggests that the residence was constructed between 1963 and 1996 (Davis, Jones, et al. 2021). As a manufactured (kit set) house, it does not display any significant characteristics or association, and it is recommended not eligible for individual listing in the NRHP because it does not meet any NRHP criteria (Davis, Jones, et al. 2021, p. 155).

3.9.3.4 Eastern Survey Area

The northeastern alignments of two transmission lines extend through the northern part of the Eastern survey area. McNary–Franklin No. 2 Transmission Line (DAHP Property ID **721666**) has been determined eligible for listing in the NRHP under Criterion A for its association with themes of commerce, engineering, industry, and government.

A roadway, Nine Canyon Road (DAHP Property ID **667765**), was previously recorded in 2012. The road extends through the rolling hills south of a canyon, crossing the Eastern survey area in three places. The road was built in approximately 1950 and has been improved multiple times. The Federal Highway Administration and DAHP determined in 2014 that the resource is not eligible for listing in the NRHP. HRA recommends that Nine Canyon Road remain not eligible for listing in the NRHP (Davis, Jones, et al. 2021, p. 176).

3.9.4 Traditional Cultural Properties

TCPs may exist within the Area of Analysis for the Yakama Nation, CTUIR, Nez Perce, and/or Wanapum Tribe. Specific cultural sites and geographic locations of cultural interest are considered confidential by the Tribes. They may include places associated with place names, spiritual sites, viewsheds, places of particular historic significance (i.e., a specific event), traditional use sites, and the specific availability of traditional food sources and medicines. The locations of TCPs within the Area of Analysis would likely remain confidential and privileged information solely for the Tribes, and the potential for significant impacts to these cultural resources is unknown.

Culturally valued and sensitive information has been passed down for generations through oral tradition, and there is potential for related landmarks to occur throughout the Area of Analysis. The Confederated Tribes and Band of the Yakama Nation's Cultural Resources Program has notified both the Applicant and EFSEC that the Project would be located in a highly sensitive and complex traditional property. They have indicated that, while the entire Project would harm this property, there are specific turbine strings that would be most impactful to cultural resources. The following sensitive areas have been highlighted during engagement with the Tribes to date: Chandler Butte, the Webber Canyon area, and the Columbia River.

The CTUIR traditional use study (TUS) executive summary identifies traditional food sources observed or expected within the Project Lease Boundary (CTUIR 2021). In summary, 21 native place names are associated with ancient use and knowledge of the land and beliefs about culture and the nature of the world (Quaempts 2021). Oral history investigations conducted for the TUS highlighted, in addition, the presence of 21 traditional food sources ("First Foods") that were either observed or expected within the Area of Analysis. The loss of access to First Foods was raised as a particular concern by elder informants. The TUS executive summary has also highlighted possible burial site locations within the Lease Boundary (CTUIR 2021). Resources of religious and cultural significance are potentially within the viewshed of the Project. The ability to pinpoint specific landmarks was also highlighted as being integral to Tribes' oral tradition, legend, and storytelling (Quaempts 2021). All TCPs within the Area of Analysis remain unevaluated for listing in the NRHP.

3.9.5 Conclusion

In summary, 48 historic and cultural resources have been identified within the Area of Analysis, including four precontact period resources, 37 historic-period resources, and seven architectural resources (see **Table 3.9-3,** below). These include two sites with mixed components (e.g., both precontact and historic cultural materials). The presence of culturally valued and sensitive spaces has been confirmed through discussions with the affected Tribes.

The baseline data collation phase for historic and cultural resources within the Area of Analysis has established a potential for precontact and historic-period sites. Precontact resources present within the Area of Analysis are indicative of ephemeral activities associated with hunting and gathering and cultural or spiritual viewpoints and/or routeways.

Historic-period archaeological resources present throughout the Area of Analysis include artifacts and features associated with agriculture and ranching, including debris scatters and farm equipment. There are 10 historic-period isolated finds. Twenty-five historic sites require further archaeological evaluation before a decision can be made. Identified architectural resources include the transmission lines that extend through the East-Central and Eastern survey areas. McNary–Franklin No. 2 Transmission Line (DAHP Property ID **721666**) has been determined eligible for listing in the NRHP under the BPA MPD.

TCPs include, but are not limited to, resources of religious and cultural significance potentially within the viewshed of the Project, as well as possible burial sites and the locations of First Foods. The specific locations of cultural and historic landmarks and other places of spiritual significance for the Tribes have not been disclosed, and coordination in this regard is ongoing.

Table 3.9-3: Historic and Cultural Resources in the Area of Analysis

ID # or Site #	Resource Type	NRHP Eligibility/Status
45BN261	Precontact (Archaeological Site)	As a precontact site, it cannot be disturbed without a permit issued under RCW 27.53.060.
45BN2146	Precontact (Isolate)	Not protected by RCW 27.53 (confirmed isolate). Consultation with Tribes is advised.
45BN2092	Precontact (Isolate)	Not protected by RCW 27.53 (confirmed isolate). Consultation with Tribes is advised.
45BN2153	Multi-component Archaeological Site: Precontact and Historic	Cannot be evaluated for listing in the NRHP without further archaeological investigation (historic component). Protected by RCW 27.53 (precontact component).
45BN2090	Precontact (Archaeological Site)	As a precontact site, it cannot be disturbed without a permit issued under RCW 27.53.060.
45BN2147	Historic (Site)	Cannot be evaluated for listing in the NRHP without further archaeological investigation.
45BN2159	Historic (Site)	Cannot be evaluated for listing in the NRHP without further archaeological investigation.
45BN2160	Historic (Site)	Cannot be evaluated for listing in the NRHP without further archaeological investigation.
45BN2161	Historic (Site)	Cannot be evaluated for listing in the NRHP without further archaeological investigation.
45BN2162	Historic (Site)	Cannot be evaluated for listing in the NRHP without further archaeological investigation.
45BN2151	Historic (Site)	Cannot be evaluated for listing in the NRHP without further archaeological investigation.
45BN2152	Historic (Site)	Cannot be evaluated for listing in the NRHP without further archaeological investigation.
45BN2084	Historic (Isolate)	Recommended not eligible for listing in the NRHP.
45BN2085	Historic (Site)	Cannot be evaluated for listing in the NRHP without further archaeological investigation.
45BN2081	Historic (Isolate)	Recommended not eligible for listing in the NRHP.
45BN2082	Historic (Isolate)	Recommended not eligible for listing in the NRHP.
45BN2083	Historic (Isolate)	Recommended not eligible for listing in the NRHP.
45BN2093	Historic (Site)	Cannot be evaluated for listing in the NRHP without further archaeological investigation.
45BN2086	Historic (Site)	Cannot be evaluated for listing in the NRHP without further archaeological investigation.
45BN2144	Historic (Isolate)	Recommended not eligible for listing in the NRHP.
45BN2143	Historic (Site)	Cannot be evaluated for listing in the NRHP without further archaeological investigation.

Table 3.9-3: Historic and Cultural Resources in the Area of Analysis

ID # or Site #	Resource Type	NRHP Eligibility/Status
45BN2145	Historic (Site)	Cannot be evaluated for listing in the NRHP without further archaeological investigation.
45BN2149	Historic (Site)	Cannot be evaluated for listing in the NRHP without further archaeological investigation.
45BN2150	Historic (Isolate)	Recommended not eligible for listing in the NRHP.
45BN2154	Historic (Site)	Cannot be evaluated for listing in the NRHP without further archaeological investigation.
45BN2163	Historic (Isolate)	Recommended not eligible for listing in the NRHP.
45BN2157	Historic (Site)	Cannot be evaluated for listing in the NRHP without further archaeological investigation.
45BN2158	Historic (Site)	Cannot be evaluated for listing in the NRHP without further archaeological investigation.
45BN205	Historic (Site)	Cannot be evaluated for listing in the NRHP without further archaeological investigations.
45BN2139	Historic (Site)	Recommended not eligible for listing in the NRHP. Low artifact density, limited subsurface potential.
45BN2140	Historic (Site)	Cannot be evaluated for listing in the NRHP without further archaeological investigations.
45BN2138	Historic (Isolate)	Recommended not eligible for listing in the NRHP.
45BN2141	Historic (Site)	Cannot be evaluated for listing in the NRHP without further archaeological investigations.
45BN2142	Historic (Site)	Cannot be evaluated for listing in the NRHP without further archaeological investigations.
45BN2155	Historic (Isolate)	Recommended not eligible for listing in the NRHP.
45BN2156	Historic (Site)	Recommended not eligible for listing in the NRHP.
45BN2148	Historic (Site) Architectural	Recommended not eligible (architectural). Unevaluated[(a)] under Criterion D (archaeological). Cannot be evaluated for listing in the NRHP without further archaeological investigations.
45BN2087	Historic (Site)	Cannot be evaluated for listing in the NRHP without further archaeological investigations.
45BN2091	Historic (Isolate)	Recommended not eligible for listing in the NRHP.
45BN2088	Historic (Site)	Cannot be evaluated for listing in the NRHP without further archaeological investigations.
45BN2089	Historic (Site)	Cannot be evaluated for listing in the NRHP without further archaeological investigations.
17302 County Well Road, Prosser (DAHP Property ID: 724939)	Historic (Site) Architectural	Recommended not eligible for individual listing in the NRHP as it does not meet any NRHP criteria.

Table 3.9-3: Historic and Cultural Resources in the Area of Analysis

ID # or Site #	Resource Type	NRHP Eligibility/Status
Grain elevator (DAHP Property ID: 722995)	Historic (Site) Architectural	Determined eligible for individual listing in the NRHP.
McNary–Badger Canyon No. 1 Transmission Line (DAHP Property ID 721665)	Historic (Site) Architectural	Recommended not eligible for individual listing in the NRHP as it does not meet any NRHP criteria.
McNary–Badger Canyon No. 1 Transmission Line (DAHP Property ID 721665)	Historic (Site) Architectural	Eligible for listing in the NRHP under the MPD for the BPA Transmission System (Criterion A).
147407 E. Beck Road (DAHP Property ID: 722996)	Historic (Site) Architectural	Recommended not eligible for individual listing in the NRHP as it does not meet any NRHP criteria.
Nine Canyon Road (DAHP Property ID 667765)	Historic Architectural	Recommended not eligible for individual listing in the NRHP as it does not meet any NRHP criteria.

Notes:
[a] "Unevaluated" = not evaluated and potentially eligible for NRHP listing
BPA = Bonneville Power Administration; DAHP = Washington State Department of Archaeology and Historic Preservation; MPD = Multiple Property Documentation; NRHP = National Register of Historic Places; RCW = Revised Code of Washington; Tribes = Confederated Tribes and Bands of the Yakama Nation, Confederated Tribes of the Umatilla Indian Reservation, Nez Perce Tribe, and Wanapum Tribe

This Page Intentionally Left Blank

3.10 Visual Aspects, Light and Glare

This section describes metrics and terminology, the applicable regulatory framework (including industry standards), and affected environment for the proposed Horse Heaven Wind Farm (Project, or Proposed Action) vicinity in relation to visual resources. The Project vicinity includes the areas south/southwest of Kennewick, Washington, in Benton County, and the larger Tri-Cities urban area along the Columbia River. The Project's consistency with relevant environmental standards, regulations, goals, and policies, and impacts from the Project and from the No Action Alternative, are evaluated in Section 4.10.

This section focuses on three aspects of visual resources in the Project vicinity—visual aspects, shadow flicker, and light and glare—and describes the metrics and terminology, and the regulatory setting—for each.

3.10.1 Visual Aspects

Metrics and Terminology

The visual resources inventory focused on three elements:

- Landscape character
- Viewing locations
- Viewer sensitivity

The term "landscape character" is used to describe the overall visual appearance of a given landscape, based on its vegetation, landforms/water, and human-made modifications. Landscape character is often described in terms of landscape character areas, which are portions of a larger landscape that share harmonizing features that result in and exhibit a particular visual character.

The visibility of the Project structures from typical or sensitive viewing locations considers the most critical places from which the public would view the Project. These are commonly referred to as key observation points (KOP) and are used to assess the Project's anticipated visual impacts. KOP locations can be static, such as residential areas, where views would occur from a consistent location, as well as linear, such as travel ways, where views change as viewers move along a road or trail.

Reactions to changes in the landscape by a viewer (also termed "receptor") is called viewer sensitivity and can vary depending on the characteristics and preferences of the viewer group. For example, residential viewers are typically expected to have a high concern regarding changes in views from their residences. These preferences may also vary depending on whether the residential viewer is a Project participant (i.e., a resident with whom the Applicant has a lease agreement) or if views are from a non-participating property. Motorists' concerns generally depend on when and where travel occurs and the type of travel involved (e.g., commuting vs. recreational travel). Recreational users' concerns vary based on the activities occurring and the length of time that receptors experience the landscape (view duration). For example, viewers at a scenic overlook would have a higher concern regarding changes in view because in this case the landscape would be viewed for a long duration and the view is integral to its use, compared to other recreational uses (e.g., birding), in which landscape is viewed for a shorter duration and is not the focus of the recreation activity.

Regulatory Setting

Benton County has adopted planning goals and policies in its Comprehensive Plan to conserve areas of potential value to the county and its residents (Benton County 2022). The following planning goals and policies are most applicable to this visual analysis:

- Public Lands designation Goal 3: Conserve visually prominent naturally vegetated steep slopes and elevated ridges that define the Columbia Basin landscape and are uniquely a product of the ice age floods.
- Policy 3: Pursue a variety of means and mechanisms such as the preparation of specific and area plans, conservation easements, clustered developments, land acquisitions and trades, statutory requirements to protect the natural landform and vegetative cover of the Rattlesnake uplift formation, notably Rattlesnake, Red, Candy, and Badger Mountains and the Horse Heaven Hills.
- Policy 4: Consider the preservation of the ridges and hillside areas through various development regulations.

These county goals and policies provide the intentions and interests of Benton County, rather than specific compliance requirements for this Project.

As part of the Washington Energy Facility Site Evaluation Council site certification process, Washington Administrative Code 463-60-362(3) identifies the following standard for analysis of visual resources (aesthetics):

> "The application shall describe the aesthetic impact of the proposed energy facility and associated facilities and any alteration of the surrounding terrain. The presentation will show the location and design of the facilities relative to the physical features of the site in a way that will show how the installation will appear relative to its surroundings. The applicant shall describe the procedures to be utilized to restore or enhance the landscape disturbed during construction (to include temporary roads)."

The Washington site certification process does not require use of a particular visual resource analysis method. This section summarizes the location and design elements of the Project that may influence existing aesthetic conditions and the analysis methods used to characterize visual resources. Section 4.10 describes how the Project would appear relative to the surrounding landscape and analysis of visual impacts of the Project.

The Visual Resource Management (VRM) system developed by the Bureau of Land Management (BLM) has become an industry standard to analyze potential visual impacts, particularly in the western United States, and is often applied to projects on non-BLM lands (BLM 1986). The BLM VRM system and other federal agency visual resource methodologies (e.g., U.S. Forest Service scenery management system and U.S. Federal Highway Administration Guidelines for the Visual Impact Assessment of Highway Projects) have three common elements:

- Scenery: continuous units of land with harmonized features that result in and exhibit a particular character
- Views (sensitivity to visual change and visibility): public viewing locations, including recreation areas, travel routes, residences, and lands with special management, where viewers have sensitivity to landscape changes
- Agency visual management requirements: identify allowable levels of change to landscape character and the allowable degree of attention that a project could attract from viewing locations

To build on the BLM VRM methods, this section also considers elements from the Visual Impact Assessment Process for Wind Energy Projects from the Clean Energy States Alliance (CESA), which were developed to address the unique visual characteristics of wind energy projects (CESA 2011).

3.10.2 Shadow Flicker

Metrics and Terminology

A turbine's rotating blades can cast a moving shadow on locations within a certain distance of the turbine. This can create a temporary phenomenon experienced by nearby viewers called "shadow flicker." This phenomenon has the potential to be a nuisance to humans in both outdoor and indoor settings (McGlinchey and Caporossi 2013). The influence area associated with shadow flicker depends on the time of year and day (which determine the angle of the sun in relation to the turbine and the receptor) and the turbine's physical characteristics (e.g., height, rotor diameter, blade width, and orientation of the rotor blades). The effect of shadow flicker on surrounding properties generally occurs during low-angle sunlight conditions, typically during sunrise and sunset. However, when the sun angle is very low (i.e., less than 3 degrees), sunlight passes through more atmosphere and becomes too diffuse to form a coherent shadow.

Shadow flicker does not occur when the sun is obscured by clouds or fog, at night, or when the source turbine(s) are not operating. In addition, shadow flicker occurs only when at least 20 percent of the sun's disc is covered by the turbine blades.

Shadow flicker intensity is calculated as the difference in brightness at a given location in the presence and absence of a shadow. Shadow flicker occurrence and intensity diminishes with greater receptor-to-turbine separation distance. In general, shadow flicker may become more noticeable the closer a viewer is to the turbine.

Regulatory Setting

Shadow flicker is not regulated in state or federal law applicable to the Project, nor is it addressed by the local county ordinances; therefore, potential shadow flicker impacts were assessed against the industry standard threshold of 30 hours per year (Lampeter 2011).

3.10.3 Light and Glare

Metrics and Terminology

Light

Light sources would be introduced as part of the Project operations as security lighting for the substations, battery energy storage systems (BESSs), and solar arrays and as aviation lighting for turbine towers and other elevated structures, per Federal Aviation Administration (FAA) requirements. Additionally, it is possible that the Project would involve nighttime construction and decommissioning activities that require lighting, though these activities would be concentrated during the daylight hours.

Light is part of the electromagnetic spectrum, which ranges from radio waves to gamma rays. Electromagnetic radiation waves are fluctuations of electric and magnetic fields, which can transport energy from one location to another. Visible light is not inherently different from other parts of the electromagnetic spectrum, with the exception that the human eye has evolved to detect visible waves. The human eye responds to light based on its frequency. The frequency of light that is within the visible range establishes the observed color. While response to light varies from person to person, the Commission Internationale de l'Eclairage (CIE) defined standard luminosity coefficients for the human eye in 1931 (CIE 1997).

Light Trespass

Light trespass refers to light or illuminance that strays from its intended purpose and potentially becomes an annoyance to nearby receptors. Some regulators have established programs to reduce light trespass caused by outdoor lighting (NCSL 2022). These programs are based on limiting the amount of light from a light source that is transmitted onto adjoining properties. Similar to noise, light trespass standards vary according to the land uses where the trespass occurs.

Sky Glow

Sky glow is stray light scattering in the atmosphere, brightening the natural sky background level, and reducing star visibility at night. Sky glow impacts are often associated with light pollution, which can have a regional effect on perceived lighting conditions. Sky glow information and comparisons are presented in **Appendix 3.10-1**.

Glare

Solar panels may be a source of reflected light during operation of the Project, and there may be temporary light reflection during construction and decommissioning from equipment windshields and glass enclosures, causing glint and glare for some viewers. ForgeSolar (2020) defines glint and glare as follows:

> "Glint is typically defined as a momentary flash of bright light, often caused by a reflection off a moving source. A typical example of glint is a momentary solar reflection from a moving car. Glare is defined as a continuous source of bright light. Glare is generally associated with stationary objects, which, due to the slow relative movement of the sun, reflect sunlight for a longer duration."

Based on the ForgeSolar definitions of glint and glare and the stationary nature of the Project's solar arrays, the potential reflectance from the Project is referred to as glare.

Regulatory Setting

Light

As part of the site certification process, Washington Administrative Code 463-60-362(2) identifies the following requirement for analysis for light and glare analysis in an Application for Site Certification (ASC):

> "The application shall describe the impact of light and glare from construction and operation and shall describe the measures to be taken in order to eliminate or lessen this impact."

Lighting conditions are assessed in terms of percentage of brightness above natural dark sky background and classified based on definitions and descriptions from CIE guidelines, which consist of a set of established Environmental Lighting Zones (ELZ) for classifying exterior light levels (CIE 1997, 2003). These zones and related quantitative thresholds are shown in **Table 3.10-1**.

Table 3.10-1: Environmental Lighting Zone Classifications for Sky Glow

ELZ	Description of the ELZ	Sky Glow (% brightness above natural dark sky)	Sky Glow (mag/arcsec^2)
E1	Intrinsically dark natural areas (e.g., national parks or protected sites, roads usually unlit)	0 % < x ≤ 20 %	21.3–23.0
E2	Areas of low district brightness (e.g., agricultural, industrial, or outer urban/rural residential areas)	20 % < x ≤ 100 %	20.4–21.3
E3	Areas of medium district brightness (e.g., industrial, or small-town centers / residential suburbs)	100 % < x ≤ 200 %	18.0–20.4
E4	Areas of high district brightness (e.g., town/city centers and commercial areas urban areas, residential and commercial with high levels of nighttime activity)	x > 200 %	<18.0

Source: CIE 1997
ELZ = Environmental Lighting Zone; mag/arcsec^2 = magnitudes per square arcsecond

The FAA outlines wind turbine lighting standards to increase the visibility of lighting systems for pilots in its Advisory Circular No. 70/7460-1L, issued on August 17, 2018. Lighting systems must consist of aviation red obstruction lights that are either flashing, strobe, or pulsed, as outlined in the Advisory Circular as FAA L-864 lighting. This lighting must be synchronized to flash with nearby systems. For wind farms, turbines with a rotor tip height above 499 feet must be lit regardless of the configuration of the larger wind farm or nearby turbines. Wind energy systems above 699 feet must feature lighting on the nacelle—the housing for the generator at the top of a turbine that is connected to the rotor—as well as at a midpoint on the turbine's mast, placed between the nacelle at the top of the turbine and the ground (FAA 2018).

Glare

The FAA developed Technical Guidance for Evaluating Selected Solar Technologies on Airports in 2010, in addition to FAA regulatory guidance under 78 Federal Register (FR) 63276 Interim Policy, FAA Review of Solar Energy System Projects on Federally Obligated Airports (FAA 2010). The FAA guidance recommends that glare analyses should be performed on a site-specific basis using the Sandia Laboratories Solar Glare Hazard Analysis Tool (FAA 2010). This tool is the standard for measuring potential visual impact as a result of solar facilities. The FAA guidance applies to solar facilities located on federally obligated airport property. It is not mandatory for solar facilities not located on an airport property (for these, a Form 7460-1 is filed with FAA pursuant to Title 14 Code of Federal Regulations [CFR] Part 77.9, as discussed below), but is considered to be an industry best practice for solar facilities in general.

According to 78 FR 63276, the FAA has determined that "glint and glare from solar energy systems could result in an ocular impact on pilots and/or air traffic control facilities and compromise the safety of the air transportation system." The FAA has developed the following criteria for analysis of solar energy projects located on jurisdictional airports:

1) No potential for glint or glare in the existing or planned air traffic control tower cab.

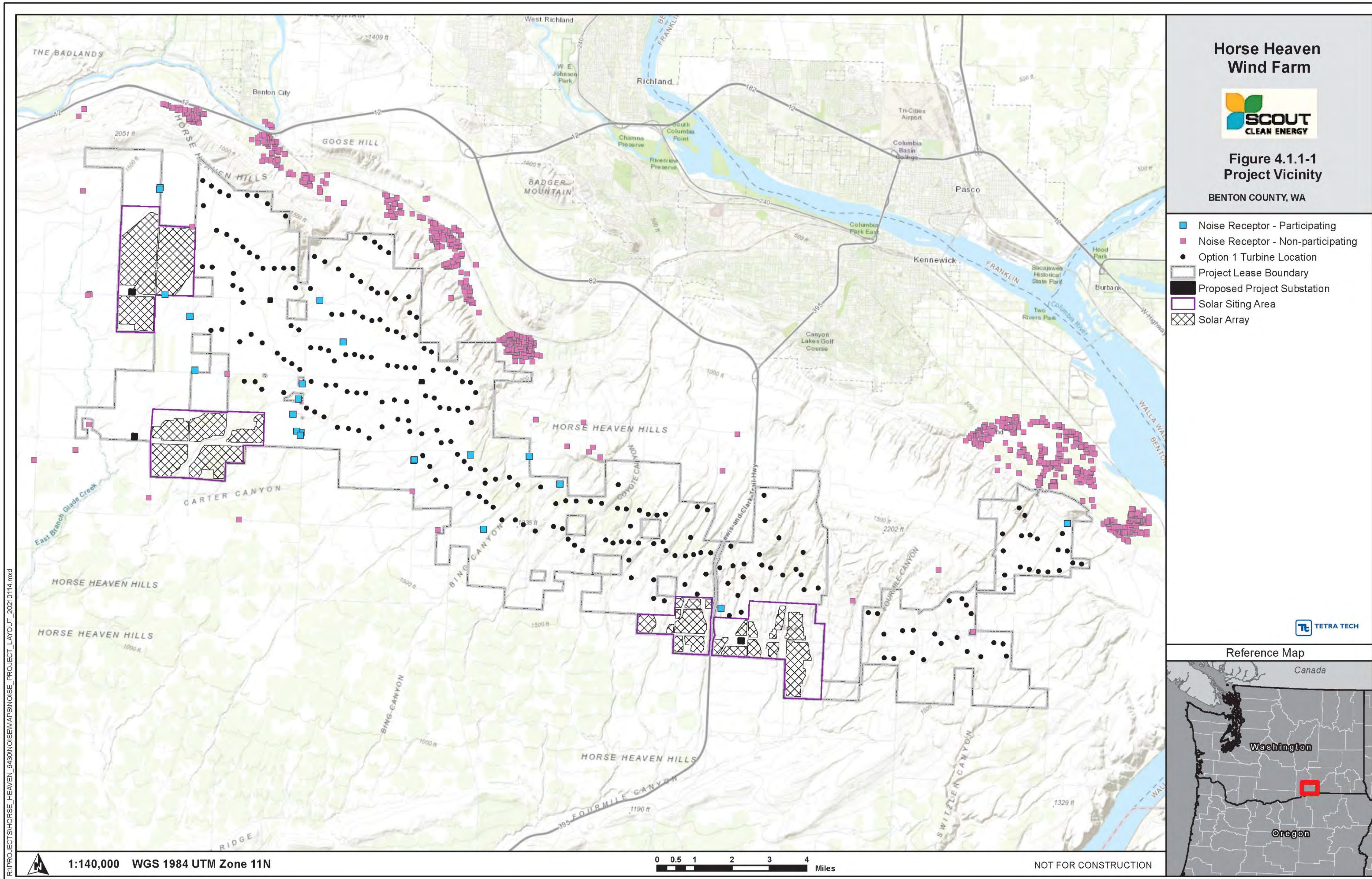
2) No potential for glare, or "low potential for after-image," along the final approach path for any existing or future landing threshold (including any planned interim phases of the landing thresholds), as shown on the

current FAA-approved Airport Layout Plan. The final approach path is defined as 2 miles from 50 feet above the landing threshold using a standard 3-degree glidepath.

The online FAA Notice Criteria Tool (NCT) reports whether a proposed structure is near a jurisdictional air navigation facility and if formal submission to the FAA under 14 CFR Part 77.9 (Safe, Efficient Use, and Preservation of the Navigable Airspace) is recommended (FAA 2020). The NCT also identifies final approach flight paths that may be considered vulnerable to a proposed structure's impact on navigation signal reception. The NCT was utilized to determine if the proposed Project is located within an FAA-identified impact area based on the Project boundaries and height above ground surface. The FAA NCT report stated that the Project does not exceed notice criteria, so a formal filing is not necessary.

3.10.4 Affected Environment

The Project Lease Boundary is dominated by rolling hills bisected by meandering canyons, some of which constitute ephemeral or intermittent drainages. The Horse Heaven Hills ridgeline lies along the northern border of the Lease Boundary. On the southern side of this ridge, the landscape transitions to rolling topography with shallow, meandering canyons that drain southwest into the Columbia River. **Figure 3.10-1** provides an overview of the Project vicinity and shows the locations of nearby residences that are considered KOPs and receptors for light and glare analysis, as well as their visual aspect. These receptors will be used to assess the Project's compliance with identified standards and guidelines as viewers potentially impacted by changes in visual aspect, light and glare in Section 4.10. The residential receptors are a subset of the noise sensitive receptors analyzed for the Project as part of the acoustic assessment (Section 3.11) and retain the associated identification numbers for cross-reference.



Source: Horse Heaven Wind Farm, LLC 2021a

Figure 3.10-1: Noise Sensitive Receptors in Project Vicinity

3.10.4.1 Visual Aspects

Inventory Methods

The visual resource area of analysis identified in the ASC was the area within 10 miles of the proposed wind turbines and transmission line and within 5 miles of the proposed solar arrays, substations, and BESSs. Based on guidance from both the BLM (Sullivan et al. 2012) and CESA (2011), the area of analysis for the wind turbines in this Draft EIS was extended to 25 miles.

Existing Landscape Character

The Project would be located within the Columbia Plateau U.S. Environmental Protection Agency Level III ecoregion, which is typically characterized by a broad expanse of sagebrush-covered volcanic plains and valleys adjacent to the Columbia River and dotted with isolated mountains (EPA 2010). There are landscape features in the area of analysis associated with a series of cataclysmic floods that occurred at the end of the most recent ice age, when glacially dammed lakes ruptured, and large volumes of water rushed through the northwestern United States (NPS 2014).

The Lease Boundary is primarily characterized by the following features:

- Panoramic landscapes are flat to rolling, comprising arid sagebrush steppe and grasslands that have been partially converted to agricultural lands.
- Topography gently slopes from north to south, with a distinctive ridge located north of the Lease Boundary that connects the elevated sagebrush steppe to the Columbia River Valley.
- There are a series of minor drainageways that dissect the landscape, with some forming small canyon settings.
- Due to the arid climate, there are limited trees within the Lease Boundary. Most trees visible in the Lease Boundary are associated with ornamental landscaping and windbreaks adjacent to residences, with the primary vegetation communities being agricultural lands with areas of remnant sagebrush steppe and grassland.
- Vegetation color in agricultural areas ranges from green to tan and brown, depending on the season and the crop being grown. More vivid colors occur along the Columbia River Valley associated with residential, commercial, and agricultural development that contrasts with the arid, muted colors found within the Lease Boundary.

The inventory of existing landscape character, based on CESA guidance, also considered the intactness of the landscape. This relates to the extent of modifications present in the existing landscape and their overall effect on natural patterns, which define the landscape. These modifications have the potential to create unintended focal points contrasting with the natural landscape character. There are three main landscape character areas that define the Lease Boundary's landscape character:

- Plateau lands west of Interstate 82 (I-82): The arid, rolling plateau lands west of the interstate are mostly intact with limited existing utility or other industrial uses. An existing transmission line traverses the western edge of the Lease Boundary, influencing the adjacent setting. There are also residences dispersed across this rural agricultural landscape, introducing geometric structures and additional vegetation in the setting associated with wind breaks and ornamental landscaping. The juxtaposition of residences and agricultural lands, including barns and other structures, creates an agrarian landscape character common to the region.

- Plateau lands east of I-82: The landscape east of the interstate is similar to the western area but includes a series of wind turbine strings associated with the existing Nine Canyon Wind Project. There is also an existing transmission line that crosses the Lease Boundary near the west side of the existing Nine Canyon Wind Project and along the southern edge of the Lease Boundary adjacent to I-82. The influence of the existing landscape modifications extends throughout this landscape, reducing its level of intactness. The tall vertical form of the existing wind turbines and their movement attract attention within the setting, generally dominating the local landscape character.
- Ridgeline: This landscape is most prominent east of I-82 but continues to the west as a connection between the flat lands adjacent to the Columbia River and the elevated steppe lands. Due to the steep terrain, this area is visually prominent as viewed from the communities located north of the Lease Boundary. There are multiple paragliding launch sites along the ridge, including Jump Off Joe butte, M&M Ridge, and Kiona Ridge (see Figure 3.12-5). Additionally, there are two strings of the existing Nine Canyon Wind Project sited along the ridge, as well as a communication tower, which reduce the intactness of the setting east of I-82.

Viewing Locations

To identify the KOP locations used in this analysis, a series of bare earth viewshed analyses were run to depict the visibility of the Project from the surrounding area. The bare earth modeling approach used in the viewshed analysis does not account for screening effects from vegetation or buildings that could block or partially block some views. In this manner, the bare earth viewshed approach results in a conservative assessment of potential Project visibility. The analysis in the ASC submitted for the Project included six viewsheds to compare visibility of the two turbine layout options, identify visibility of the three solar array siting areas, and assess the visibility of the proposed transmission lines (Horse Heaven Wind Farm, LLC 2021b). Based on the expansion of the area of analysis for the wind turbines from 10 miles to 25 miles, the viewsheds associated with the two turbine layout options were updated in the Horse Heaven Wind Farm Project Visual Impact Assessment Report (**Appendix 3.10-2**) to include this larger, regional setting (SWCA 2022).

Within Horse Heaven Wind Farm, LLC's (Applicant) visual resources area of analysis, results of the viewshed analyses and aerial photography were used to identify potential KOPs, including:

- Residential structures
- Travel ways
- Cultural resources with visual aspects
- Recreation areas
- Other areas of interest, including open space areas

These KOPs represent critical viewpoints, typical views in representative landscapes, and views of any special Project features. Additionally, the Applicant sought input from Benton County to identify potential areas of interest to local community members. Benton County noted interest on the part of residents located north of the Project. This area of interest contains a large number of residences, as well as a series of parks and other recreation areas. The resulting list of potential KOPs was visited and photographed, and a series of KOPs were identified for analysis to represent the range of viewers and locations that would have views of the proposed Project infrastructure. In addition to these Applicant-selected KOP locations, supplementary viewing locations were considered to represent views from dispersed residences located directly adjacent to the proposed wind turbines and views from Horse Heaven Hills, a BLM-managed dispersed recreation area (BLM 2022).

The types of users in the visual study areas include residents of the adjacent Tri-Cities communities, including Benton City, Burbank, Kennewick, Pasco, Richland, West Richland, Finley, and Prosser; travelers on the various interstates and highways; and recreationists visiting the Rattlesnake, Red, Candy, and Badger Mountains, McNary National Wildlife Refuge, and other recreational facilities in the area. Lands within the Lease Boundary are also of interest to the Confederated Tribes and Bands of the Yakama Nation, Confederated Tribes of the Umatilla Indian Reservation, and Nez Perce Tribe, who may attach cultural significance to natural landscape components.

Distance from the Project is a key factor in determining potential visual impacts, with the amount of perceived contrast generally diminishing as distance between the viewer and the affected area increases (BLM 1986). Contrast is defined as the level of visible change to the existing features of the landscape (including landform/ water, vegetation, and human-made structures) resulting from the introduction of a project or management activity. The BLM VRM system and other visual resource systems establish a series of distance zones to identify visibility thresholds and inventory the existing landscape. For the purposes of this study, the distance to the Project (in miles) was used to identify viewing distance, with a particular focus on the foreground distance zone. This area corresponds to the area within 0.5 miles of the Project, where views of modifications to the landscape would be most prominent, leading to views potentially dominated by Project infrastructure.

The list of viewing locations and KOPs used in this analysis, as well as the associated viewer type, viewer sensitivity, and distance to the Project, are presented in **Table 3.10-2** and depicted in **Figure 3.10-2**. Some of the KOPs have multiple views looking in different directions such as KOP 2 (KOP 2a, 2b, and 2c), which includes potential views of the Project to the southeast, south, and southwest (Horse Heaven Wind Farm, LLC 2021b).

Table 3.10-2: Key Observation Point Locations

KOP Number	Viewer Name	Viewer Type	Viewer Sensitivity	Distance to Project	Description
1	McNary National Wildlife Refuge (NWR)	Recreation	Moderate	5.2 miles (wind turbines) Solar arrays, transmission lines, and substations/ BESSs would not be visible from this location.	Viewpoint is located along an unpaved road within the McNary NWR, looking southwest across the Columbia River toward the Project Lease Boundary.
2 (2a, 2b, and 2c)	S Clodfelter Road – East, Central, and West	Residential	High	3.0 miles (wind turbines) 3.4 miles (transmission line) Solar arrays and substations/BESSs would not be visible from this location.	Viewpoint is located along the south side of Manuel Drive, toward S. Clodfelter Road, looking southeast to southwest.
3	Chandler Butte	Recreation	High	2.5 miles (wind turbines) 2.1 miles (solar array) 4.2 miles (transmission line) The substations/BESSs would be visible from this location but would be outside of the photo frame.	Viewpoint is located along the unpaved road east of the communication towers, looking southeast.

Table 3.10-2: Key Observation Point Locations

KOP Number	Viewer Name	Viewer Type	Viewer Sensitivity	Distance to Project	Description
4 (4a and 4b)	I-82 South	Travel route	Moderate	7.0 miles (wind turbines) 6.0 miles (solar array) 6.5 miles (transmission line) The HH-East Substation/ BESSs would be visible from this location.	Viewpoint is located along the right shoulder of the highway, looking northwest to northeast.
5	Badger Mountain	Recreation	High	4.7 miles (wind turbines) Solar arrays, transmission lines, and substations/ BESSs would not be visible from this location.	Viewpoint is located along the southern side of the top of Badger Mountain looking southwest.
6	Bofer Canyon Road/I-82	Travel route	Moderate	1.7 miles (wind turbines) 0.6 mile (solar array) 1.2 miles (transmission line) The HH-East Substation/ BESSs would be visible from this location but would be outside of the photo frame.	Viewpoint is located along the right shoulder of the road, looking north.
7	Highway 221	Travel route, residential	High	5.8 miles (wind turbines) 3.1 miles (solar array) 2.2 miles (transmission line) The HH-West Substation/ BESSs would be visible from this location.	Viewpoint is located along the right shoulder of the highway, looking northeast.
8 (8a and 8b)	Kennewick (Canyon Lakes Area) – South and West	Residential	High	3.6 miles (wind turbines) 5.9 miles (solar array) 7.4 miles (transmission line) The substations/BESSs would not be visible from this location.	Viewpoint is located on the southwest end of S. Olson Street, looking west to south.
9	Benton City	Residential, travel route, commercial	High	2.7 miles (wind turbines) 3.9 miles (solar array) 5.5 miles (transmission line) The substations/BESSs would not be visible from this location.	Viewpoint is located on the east side of Division Street/State Route 225, looking south.
10	Badger Road	Residential, travel route	High	1.5 miles (wind turbines) 6.4 miles (solar array) 4.3 miles (transmission line) The substations/BESSs would not be visible from this location.	Viewpoint is located on the north side of Badger Road, looking southwest.

Table 3.10-2: Key Observation Point Locations

KOP Number	Viewer Name	Viewer Type	Viewer Sensitivity	Distance to Project	Description
11	Highland/ Finley Area	Residential	High	2.0 miles (wind turbines) 8.5 miles (solar array) 8.7 miles (transmission line) The substations/BESSs would not be visible from this location.	Viewpoint is located on the north side of E. Cougar Road near an entrance driveway to Finley Elementary School, looking southeast.
12	County Well Road	Residential, travel route	High	2.5 miles (wind turbines) 0.2 miles (solar array) 0.2 miles (transmission line) The HH-West (Alternative) Substation/BESSs would be visible from this location and located 0.5 mile away.	Viewpoint is located on the left shoulder of County Well Road, looking northeast.
13	Travis Road South of Sellards Road	Residential, travel route	High	1.1 miles (wind turbines) 1.0 mile (solar array located outside of photo frame) 0.1 mile (transmission line) The substations/BESSs would not be visible from this location.	Viewpoint is located on the right shoulder of Travis Road, looking north.
N/A	Dispersed residences located 0.5 mile from proposed turbines (foreground views)	Residential	High	Less than 0.5 mile (wind turbines) The other Project component distances would vary but are more specifically described from other KOP locations.	There are approximately 14 residences located within the foreground distance zone of the proposed wind turbines, less than 0.5 mile, with three of those identified as non-Project participating properties. Additionally, there are numerous residences located within 0.5 to1 mile of the proposed wind turbines.
N/A	Horse Heaven Hills Recreation Area	Recreation	Moderate	0.8 mile (wind turbines) Solar arrays, transmission lines, and substations/ BESSs would not be visible from this location.	Dispersed recreation including opportunities for hiking, nature viewing, and mountain biking with potential views of the Project to the south.

Source: SWCA 2022
BESS = battery energy storage system; KOP = Key Observation Point; N/A = not applicable

This Page Intentionally Left Blank

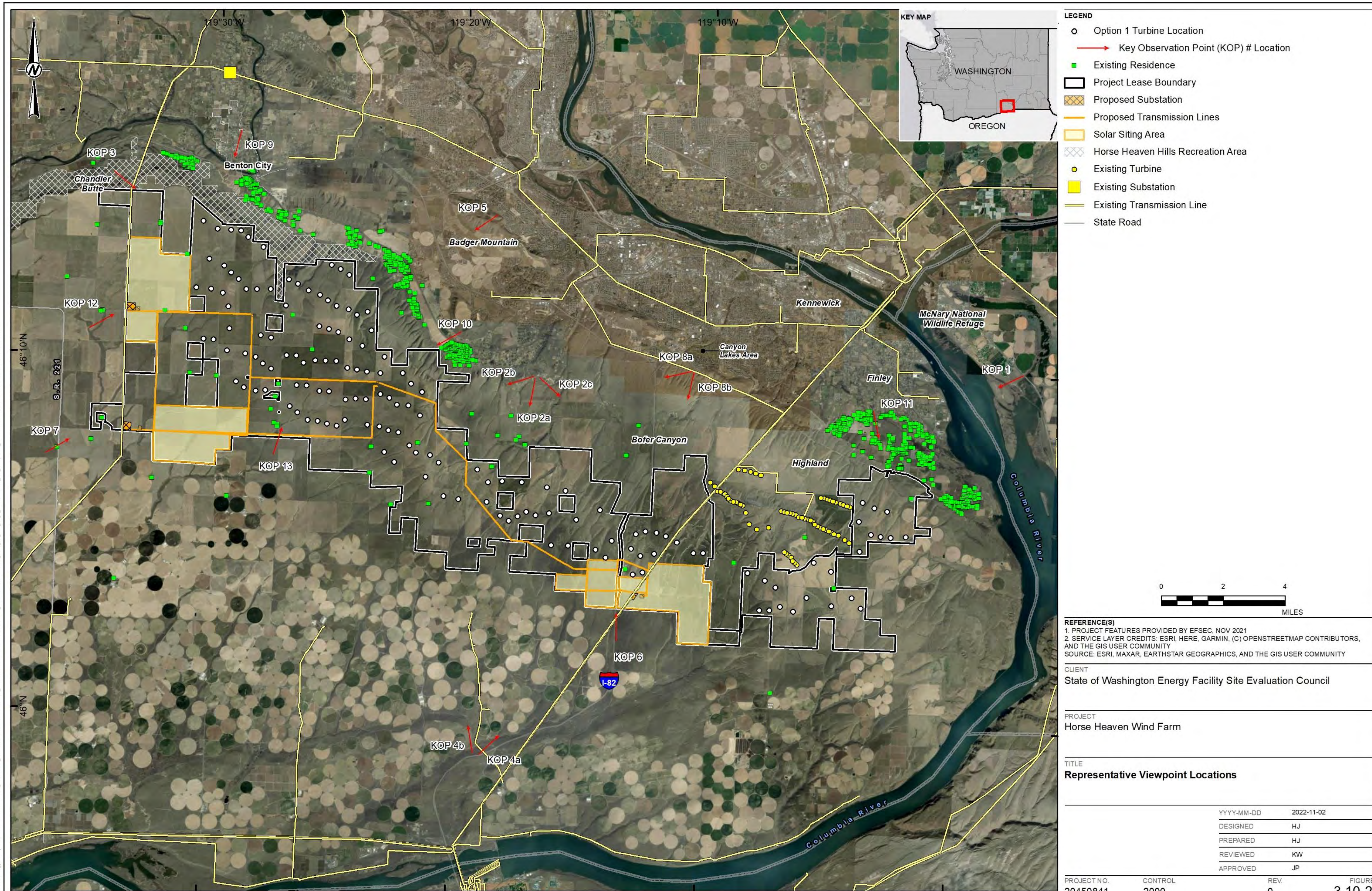


Figure 3.10-2: Representative Viewpoint Locations

A series of visual simulations were prepared from KOPs 1 through 13, with both wind turbine options depicted, and are included in **Appendix 3.10-2**. No simulations were developed from either of the unnumbered KOP viewing locations (e.g., Horse Heaven Hills Recreation Area or dispersed residences within foreground distance zone) as these locations represent distributed views from within the BLM recreation area or from multiple, dispersed residences near proposed turbine locations. Existing condition photographs were taken using standard focal lengths to most closely represent the human field of view. To create photographic simulations, a three-dimensional model of the turbine, solar array, and transmission line layouts were placed in the photographic view, taking into consideration Lease Boundary topography (elevation) and distance from the observation point. Simulated turbines, solar arrays, and transmission lines were aligned to the photographs, and the model was rendered and composited to create the visualizations. Some of the KOP locations have multiple simulations looking in different directions, such as KOP 2, which includes potential views of the Project to both the southeast, south, and southwest (Horse Heaven Wind Farm, LLC 2021b).

3.10.4.2 Light and Glare

The landscape surrounding the Project is primarily natural, residential, or agricultural land use and therefore has limited sources of artificial light at night. Existing light or glare could occur from vehicles traveling on local roadways and I-82, nearby rural residential development, the adjacent Nine Canyon Wind Project, and any nearby Bonneville Power Administration substations. No street lighting exists along local roadways. The level of light and glare from these sources is low, and typical for the rural, largely agricultural setting.

The assessment of the existing nighttime lighting is based on the current perceived lighting conditions experienced by viewers at night. To establish a baseline of pre-project lighting conditions, the existing sky glow light levels can be assumed based on receptor locations and their surrounding land uses. The receptor locations are shown in **Figure 3.10-1**.

Based on the ELZ classifications outlined in **Table 3.10-1**, identified receptors inside the Lease Boundary and in the Project vicinity fall into one of the middle two ELZ classifications:

- E2 – Participating residences and receptors adjacent to the Lease Boundary located in rural low density agricultural areas. Light trespass assumed to be indistinguishable from property to property at this ELZ.
- E3 – Receptors adjacent to the Lease Boundary and receptors located in the Project vicinity that are in less rural and more densely populated residential areas, mainly to the north of the Project. Light trespass assumed to be indistinguishable to small from property to property at this ELZ.

This Page Intentionally Left Blank

3.11 Noise and Vibration

This section describes the existing noise and vibration environment, as well as the regulatory setting, for the proposed Horse Heaven Wind Farm (Project, or Proposed Action) vicinity. The Project vicinity includes the areas 4 miles south/southwest of Kennewick, Washington, in Benton County, and the larger Tri-Cities urban area along the Columbia River. The Project's potential impacts to noise and vibration including consistency with relevant environmental standards, regulations, goals, and policies is evaluated in Section 4.11.

Acoustic Metrics and Terminology

Acoustic values can be described in terms of noise or sound. Sound is generated by pressure fluctuations in the air. Noise is generally defined as any "unwanted" sound and is therefore based on human perception, but the terms "noise" and "sound" are often used interchangeably. Sound propagation involves three principal components: a sound source, a person or a group of people, and a transmission path. While two of these components, the sound source and the transmission path, are easily quantified (i.e., by direct measurements or through predictive calculations), the effect of noise on humans is hard to determine. It is difficult to predict a response from one individual because there is variation in how people perceive and react to noise.

Level of noise is related to magnitude of sound pressure, which is referred to as sound pressure level (SPL) and is measured in units called decibels (dB). The higher the decibel value, the louder the sound. Decibels are calculated as a logarithmic function of the measured SPL in the air in relation to a reference effective sound level of 0 dB, which is considered the hearing threshold. To account for human response to sound, it is common to use the A-weighted sound level (noted in units of dBA) in evaluating noise sources and their impacts on humans. The A-weighted scale expresses relative loudness as perceived by the human ear, by reducing sound levels mostly at low frequencies to which the human ear is less sensitive. Accordingly, A-weighted decibels will almost always be lower than unweighted decibels.

The following SPL data parameters are typically collected during a typical noise study:

- Leq – The equivalent continuous SPL averaged over the measurement period; this parameter is the continuous steady SPL that would have the same total acoustic energy as the real fluctuating noise over the same time.
- Lmax – The maximum SPL for the sampling period.
- Lmin – The minimum SPL for the sampling period.
- Ldn – The day-night average SPL is calculated with a 10 dBA "penalty" added to nighttime hours (10 p.m. to 7 a.m.). This is done to evaluate potential human response in residential land uses, where humans are more sensitive to nighttime noise impacts.
- Ln – The SPLs that were exceeded n percent of the time during the sampling period. For example, L90 is the level exceeded 90 percent of the time.

Vibration

Vibration is an oscillatory motion through a solid medium in which the motion's amplitude can be described in terms of displacement, velocity, or acceleration. Ground-borne noise occurs when vibration radiates through a building interior and creates a low-frequency sound, often described as a rumble, as when a train passes by (FTA 2018). However, in contrast to airborne noise, ground-borne vibration is not a common environmental problem. It is unusual for vibration from sources such as large construction equipment to be perceptible at distances greater than 100 feet.

Regulatory Setting

Federal Regulations

There are no federal noise regulations applicable to the Project.

Washington Administrative Code Statutes

Environmental noise limits have been established by Washington Administrative Code (WAC) 173-60. WAC 173-60 establishes limits on sounds crossing property boundaries based on the Environmental Designation for Noise Abatement (EDNA) of the sound source and the receiving properties.

- Class A EDNA – Lands where people reside and sleep. They typically include residential property; multiple family living accommodations; recreational facilities with overnight accommodations such as camps, parks, camping facilities, and resorts; and community service facilities, including orphanages, homes for the aged, hospitals, and health and correctional facilities.
- Class B EDNA – Lands involving uses requiring protection against noise interference with speech. These typically include commercial living accommodations; commercial dining establishments; motor vehicle services; retail services; banks and office buildings; recreation and entertainment property not used for human habitation such as theaters, stadiums, fairgrounds, and amusement parks; and community service facilities not used for human habitation (e.g., educational, religious, governmental, cultural, and recreational facilities).
- Class C EDNA – Lands involving economic activities that tend to have noise levels higher than those normally experienced in other areas. Typical Class A EDNA uses generally are not permitted in such areas. Typically, Class C EDNA uses include storage, warehouse, and distribution facilities; industrial property used for the production and fabrication of durable and nondurable man-made goods; and agricultural and silvicultural property used for the production of crops, wood products, or livestock.

The noise level limits by EDNA classifications are presented in **Table 3.11-1**. Between the hours of 10:00 p.m. and 7:00 a.m., the noise limitations are reduced by 10 dBA for receiving property within Class A EDNAs. The WAC allows these limits to be exceeded for certain periods of time:

- 5 dBA for no more than 15 minutes in any hour
- 10 dBA for no more than 5 minutes of any hour
- 15 dBA for no more than 1.5 minutes of any hour

WAC 173-60-050 exempts daytime noise generated by blasting and temporary daytime construction noise from the state noise limits.

Table 3.11-1: Washington State Environmental Noise Limits

EDNA of Noise Source Property	EDNA of Receiving Property		
	Class A Day/Night	Class B Land	Class C Land
Class A	55/45	57	60
Class B	57/47	60	65
Class C	60/50	65	70

Source: Washington Administrative Code 173-60-040
EDNA = Environmental Designation for Noise Abatement

Table 3.11-2 shows a maximum noise limit of 60 dBA for a Class C noise source and a Class A receiving property, which is subject to a further reduction of 10 dBA during nighttime hours. The WAC regulatory limits are absolute and independent of the existing acoustic environment; therefore, an ambient sound survey is not required in order to determine conformance. However, based on the requirements under WAC 463-60-352 Built Environment – Environmental Health, and to describe and quantify the background noise environment, an ambient sound survey has been conducted for the Project. The original baseline survey was completed by Tetra Tech, commencing on December 22, 2020, and concluding on January 19, 2021 (Tetra Tech 2021). A supplemental baseline survey was completed by Tetra Tech to collect additional data, commencing on February 14, 2022, and concluding on March 1, 2022 (Horse Heaven Wind Farm, LLC 2022).

Table 3.11-2: Ln Environmental Noise Limits for Class C Sources

EDNA of Source Property	EDNA of Receiving Property			
	Limit	Ln25	Ln8.3	L2.5
Class A Land (day/night)	60/50	65/55	70/60	75/65
Class B Land	65	70	75	80
Class C Land	70	75	80	85

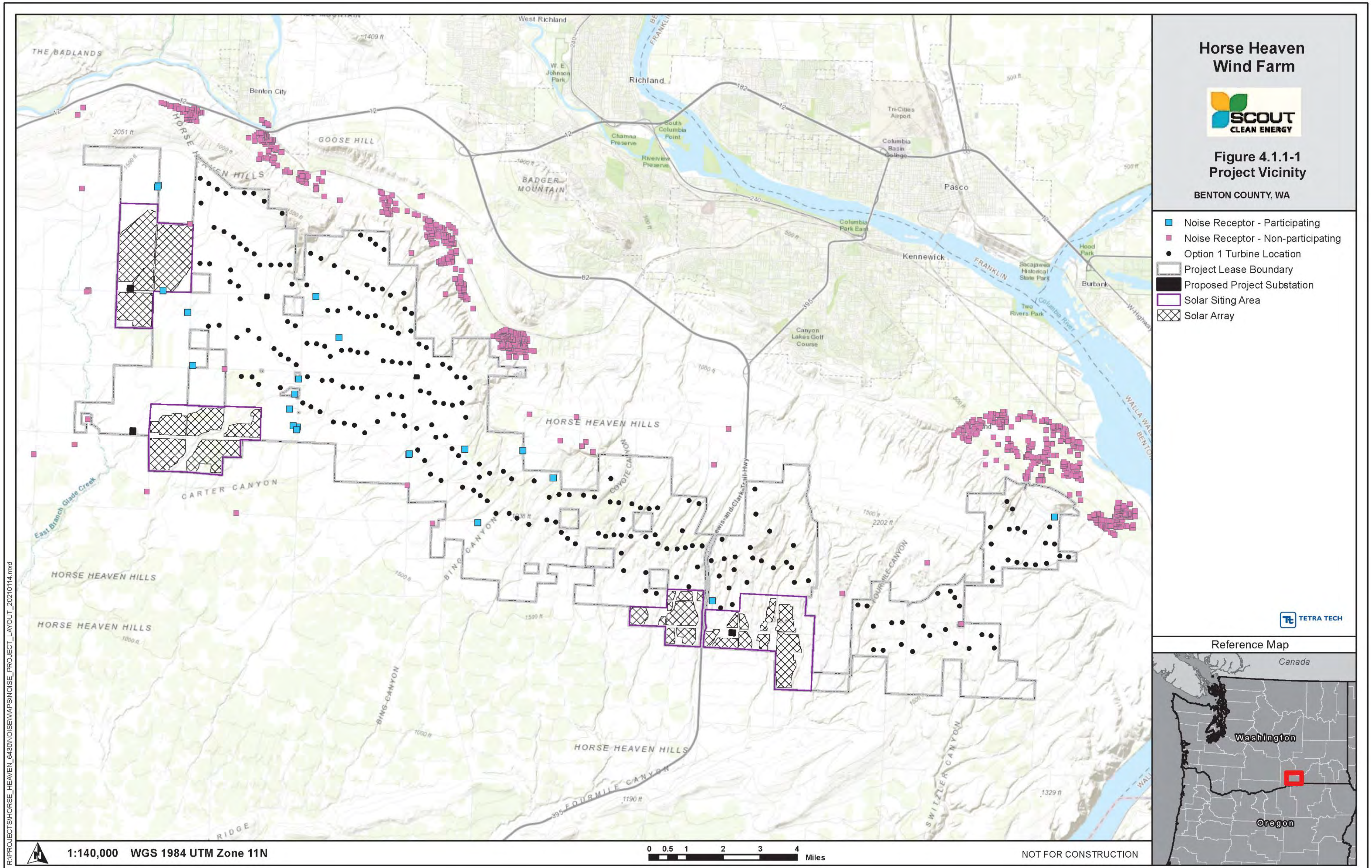
Source: Washington Administrative Code 173-60-040 (b) and (c)
EDNA = Environmental Designation for Noise Abatement; Ln2.5 = SPL exceeded 2.5% of the time; Ln8.3 = SPL exceeded 8.3% of the time ; Ln25 = SPL exceeded 25% of the time; SPL = sound pressure level

Benton County Code

Chapter 6A.15 of the Benton County Code provides language pertaining to public disturbance and nuisance noise; however, sounds originating from industrial or commercial activities, as well as construction or refuse removal equipment, are exempt (Benton County 2021). The code requires all projects to comply with all noise regulations under WAC 173-60.

3.11.1 Affected Environment

The Project Lease Boundary is dominated by rolling hills bisected by meandering canyons, some of which constitute ephemeral or intermittent drainages. The Horse Heaven Hills ridgeline lies along the northern border of the Lease Boundary, particularly in the western portion. On the southern side of this ridge, the landscape transitions to relatively rolling topography with shallow, meandering canyons that drain southwest into the Columbia River. **Figure 3.11-1** provides an overview of the Project vicinity and provides the locations of nearby residences that are considered noise sensitive receptors (NSR). These receptors will be used to assess compliance of the Project with WAC standards as a receiving property for noise. NSR locations typically include residences, hospitals, schools, parks, and churches, and, for the purposes of this study, represent Class A EDNA receiving land uses. Impacts from the Proposed Action at NSR locations will consider their current acoustic environment, as well as future sources of noise.



Source: Horse Heaven Wind Farm, LLC 2021
Figure 3.11-1: Noise Sensitive Receptors in Project Vicinity

Variations in acoustic environment and vibration are due in part to:

- Existing land uses
- Population density
- Proximity to transportation corridors

Elevated existing ambient sound levels in the region occur near major transportation corridors such as Interstate 82 (I-82) and in areas with higher population densities such as Benton City or Kennewick (Horse Heaven Wind Farm, LLC 2021). The Lease Boundary is primarily open land or rural in nature and will have comparatively lower ambient sound levels, possibly 30 dBA or less during nighttime, due to the limited number of anthropogenic noise sources. Principal contributors to the existing acoustic environment likely include:

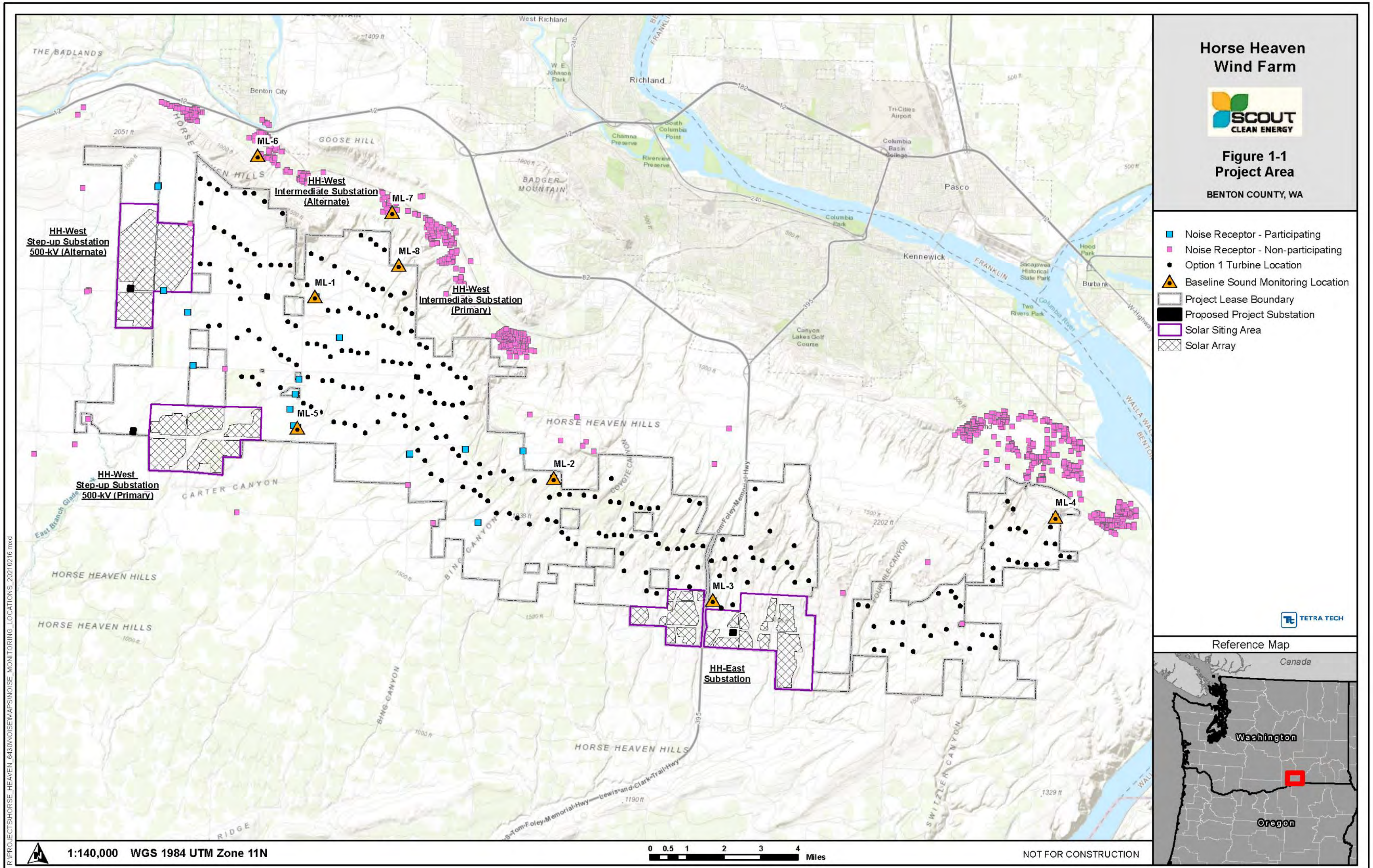
- Motor vehicle traffic
- Mobile farming equipment
- Farming activities such as plowing and irrigation
- All-terrain vehicles
- Local roadways
- Rail movements
- Periodic aircraft flyovers
- Natural sounds such as birds, insects, and leaf or vegetation rustle during elevated wind conditions

Noise sources are typically louder and more numerous during the daytime than at night—referred to as a “diurnal” pattern. This diurnal pattern typically results in sound levels that are quieter at night than during the daytime, except during periods when evening and nighttime insect noise dominate in warmer seasons.

Ground-borne vibration generated by human activities (e.g., rail and roadway traffic, operation of mechanical equipment and typical construction equipment) typically diminishes rapidly with distance from the vibration source. The Federal Transit Administration uses a screening distance of 100 feet for highly vibration-sensitive buildings (e.g., hospitals with vibration-sensitive equipment) and 50 feet for residential uses and historic buildings (FTA 2018). Vibration-sensitive receptors generally include historic buildings, buildings in poor structural condition, and uses that require precision instruments (e.g., hospital operating rooms or scientific research laboratories). Given the current land uses in the Project vicinity, existing vibrations in the area would be assumed to be at a typical background level and well below the human threshold of perception. No vibration measurements were collected for this study.

3.11.1.1 Ambient Noise Surveys

To document ambient sound levels within the Project Lease Boundary and vicinity, two baseline sound surveys were conducted by Tetra Tech. The original survey was submitted as an addendum to Appendix O of the Application for Site Certification in February 2021 (Horse Heaven Wind Farm, LLC 2021; Tetra Tech 2021). A supplemental noise survey was conducted to collect data at additional locations and was submitted (Horse Heaven Wind Farm, LLC 2022). For these two surveys, seven NSR locations and one boundary location were selected as monitoring positions for the baseline sound survey. These locations were selected because they are spatially distributed throughout the area and would represent the existing acoustic environment. **Figure 3.11-2** shows the Lease Boundary and vicinity and the location of the eight baseline sound monitoring stations.



Source: Horse Heaven Wind Farm, LLC 2022

Figure 3.11-2: Baseline Sound Monitoring Stations in Project Vicinity

The baseline sound survey commenced on December 22, 2020, and concluded on January 19, 2021. Data were collected at each monitoring location for a period of approximately 14 days within that window. A long-term baseline survey is necessary to provide a statistically relevant data set, covering the full range of wind speeds and future operational scenarios. A 10-day monitoring period, weather permitting, provides a representative period to obtain baseline data set. The monitoring locations, dates, and sample type are presented in **Table 3.11-3** and **Figure 3.11-2**.

Table 3.11-3: Monitoring Locations Included in the Baseline Noise Study

Monitoring Location	Geographic Coordinates[a]		Location Description	Observations
	Latitude	Longitude		
ML-1	311134E	5117731N	Residence along Henson Road in Prosser	Quiet, with agricultural activities and sporadic noise from animals on site.
ML-2	321518E	5109850N	Residence along C Williams Road in Kennewick	Very quiet, with no roadway noise heard.
ML-3	328433E	5104539N	Residence along S. Bofer Canyon Road in Benton County	Some distant roadway noise from I-82.
ML-4	343329E	5108162N	Residence along Finley Road in Kennewick	Distant farming activity and noise from geese could also be heard.
ML-5	310369E	5112039N	Residence along S. Travis Road in Prosser	Moderate agricultural activity and semi-frequent road traffic along S. Travis Road.
ML-6	308632E	5123877N	Property along N McBee Road in Benton City	Local and distant road traffic.
ML-7	314483E	121403N	Residence along Canyon View Pr Northeast in Benton City	Minor agricultural activity, some construction, local traffic.
ML-8	314766E	119102N	Near Project Lease Boundary east of Dennis Road in Benton City	Infrequent agricultural activity.

Sources: Tetra Tech 2021, Horse Heaven Wind Farm, LLC 2022
Notes:
[a] Universal Transverse Mercator Zone 11T
I-82 = Interstate 82; ML = Monitoring Location

Table 3.11-4 displays the average daytime and nighttime ambient sound levels for each monitoring location and the Project Lease Boundary and vicinity for wind speed conditions ranging from calm to maximum rotational wind speed. Ambient sound levels fluctuated constantly during both daytime and nighttime hours, but generally followed a diurnal pattern, and sound levels generally increased with the increase of wind speed.

Table 3.11-4: Baseline Sound Survey Results, Leq (Average dBA)

Monitoring Location	Time Period	Wind Speed (m/s)									
		3	4	5	6	7	8	9	10	11	12
ML-1	Day	32	32	33	33	34	35	36	37	38	39
	Night	33	33	34	35	36	37	38	39	40	41
ML-2	Day	33	33	33	32	32	32	33	33	33	33
	Night	31	32	32	32	33	33	34	34	34	34
ML-3	Day	48	48	47	47	47	47	47	47	47	47
	Night	42	43	44	45	46	46	47	48	48	48
ML-4	Day	38	38	39	39	39	40	40	40	40	40
	Night	36	37	37	38	38	38	39	39	39	39
ML-5	Day	45	45	45	45	44	44	44	44	45	45
	Night	39	39	39	39	39	39	40	40	41	41
ML-6	Day	42	42	43	44	44	45	46	47	48	49
	Night	39	40	41	43	44	45	46	47	48	49
ML-7	Day	37	37	38	39	40	41	42	43	44	45
	Night	30	32	34	36	37	39	41	42	44	45
ML-8	Day	32	34	36	38	40	42	44	46	48	50
	Night	25	28	32	34	37	40	42	44	47	49
Cumulative	Day	37	38	39	40	41	41	42	43	43	44
	Night	34	36	37	38	39	40	41	42	43	44

Source: Horse Heaven Wind Farm, LLC 2022; Tetra Tech 2021
dBA = A-weighted decibels; Leq = the equivalent continuous sound pressure level averaged over the measurement period; ML = Monitoring Location; m/s = meters per second

- Location ML-1 – This location was an exception to the diurnal variation, with daytime noise levels ranging from 32 to 39 dBA and nighttime noise levels ranging from 33 to 41 dBA. Increases in daytime ambient sound levels at ML-1 can be attributed to the agricultural activities occurring on the site.
- Location ML-2 – Ambient sound levels were consistently low and ranged from 32 to 33 dBA during the daytime and 31 dBA to 34 dBA at night. While some sporadic on-site activity and roadway noise contributed to daytime sound levels, the ambient acoustic environment at ML-2 is quiet.
- Location ML-3 – Ambient sound levels were relatively higher due to this location's proximity to I-82 and range from 47 to 48 dBA during the daytime and 42 to 48 dBA at night. The maximum noise level represents noise generated from highway traffic being similar during the day and night. The greater range at night indicates lower frequency of traffic during that specific time period.
- Location ML-4 – Ambient sound levels were slightly higher during the day than at night and ranged from 38 to 40 dBA during the day and 36 to 39 dBA at night. This location best represents the more densely populated land uses in the Lease Boundary as it was located near the community of Finley, to the northeast of the Lease Boundary.
- Location ML-5 – Ambient sound levels exhibited typical diurnal variation but were affected by both nearby agricultural activity and traffic-related noise occurring on S. Travis Road and ranged from 44 to 45 dBA during the daytime and 39 to 41 dBA at night.

- Location ML-6 – Ambient sound levels were relatively higher due to this location's proximity to I-82 (less than 1 mile), local traffic, and proximity to a more densely populated area. The noise levels range from 42 to 49 dBA during the daytime and 39 to 49 dBA at night. The maximum noise level represents noise generated from traffic and higher wind speeds in a high-density vegetation area. This location best represents Benton City.
- Location ML-7 – Ambient sound levels were slightly higher during the day than at night and ranged from 37 to 45 dBA during the day and 30 to 45 dBA at night. The results suggest more anthropogenic noise sources during the daytime, with elevated noise levels coming from higher winds, local traffic, and equipment operations.
- Location ML-8 – Ambient sound levels exhibited typical diurnal variation and were also notably affected by wind speeds with higher noise levels mostly occurring during high wind events. The location is more remote, near the Project Lease Boundary and the noise levels ranged from 32 to 50 dBA during the daytime and 25 to 49 dBA at night.

This Page Intentionally Left Blank

3.12 Recreation

This section describes the recreation uses and areas that would be affected by the proposed Horse Heaven Wind Farm (Project, or Proposed Action). Washington Administrative Code 463-60-362 states that "the application shall list all recreational sites within the area affected by the construction and operation of the facility and shall then describe how each will be impacted by the construction and operation." Section 4.12 describes impacts on recreation that could result from the construction, operation, and decommissioning of the Proposed Action or No Action Alternative.

Background

Areas devoted to recreation provide people with the opportunity to engage with and enjoy the natural and built environment. Outdoor recreation is an important aspect of life for residents of the Horse Heaven Hills area, and it provides economic benefits to the communities. The Project's study area for recreation includes existing recreation resources and activities within the Project's Lease Boundary and the 25 miles surrounding the Lease Boundary. With the exception of 10 acres that the Washington State Department of Natural Resources (DNR) manages on behalf of the state's citizens, private entities own the entire 72,428 acres within the Lease Boundary.

Recreational facilities, defined by Revised Code of Washington 36.69.010, can include, but are not limited to:

- Parks
- Coliseums for the display of spectator sports
- Playgrounds
- Public campgrounds
- Gymnasiums
- Boat ramps and launching sites
- Swimming pools
- Public hunting and fishing areas
- Field houses
- Arboretums
- Bathing beaches
- Bicycle and bridle paths
- Stadiums
- Senior citizen centers
- Golf courses
- Automobile racetracks and drag strips
- Community centers
- Other recreational facilities

The following sections describe existing recreational opportunities and conditions in the study area, separated into three categories: county and private recreational opportunities, state recreational opportunities, and federal recreational opportunities.

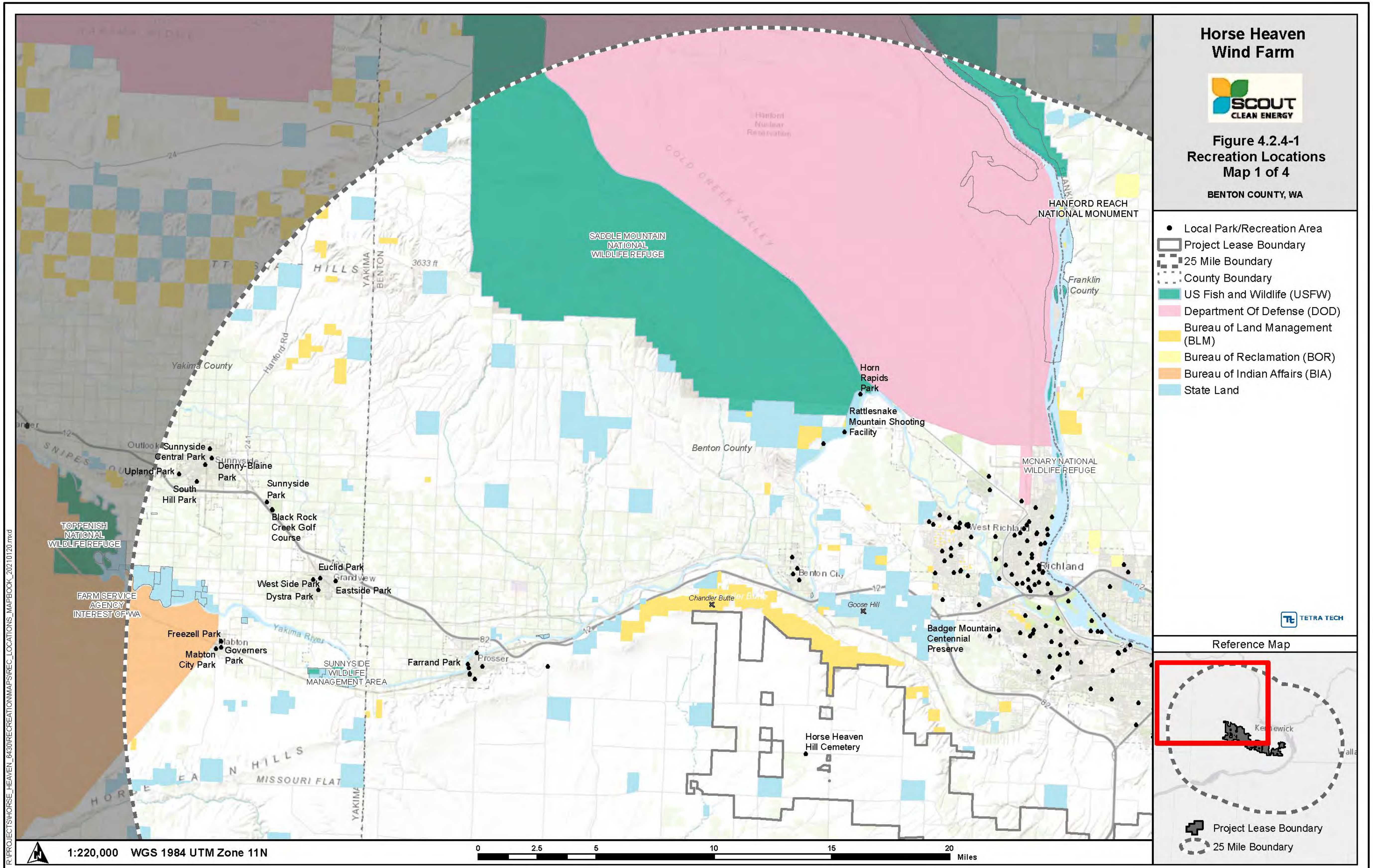
3.12.1 Affected Environment

The study area for recreation resources is in the southeastern portion of Washington and portions of northern Oregon and includes lands within the following counties:

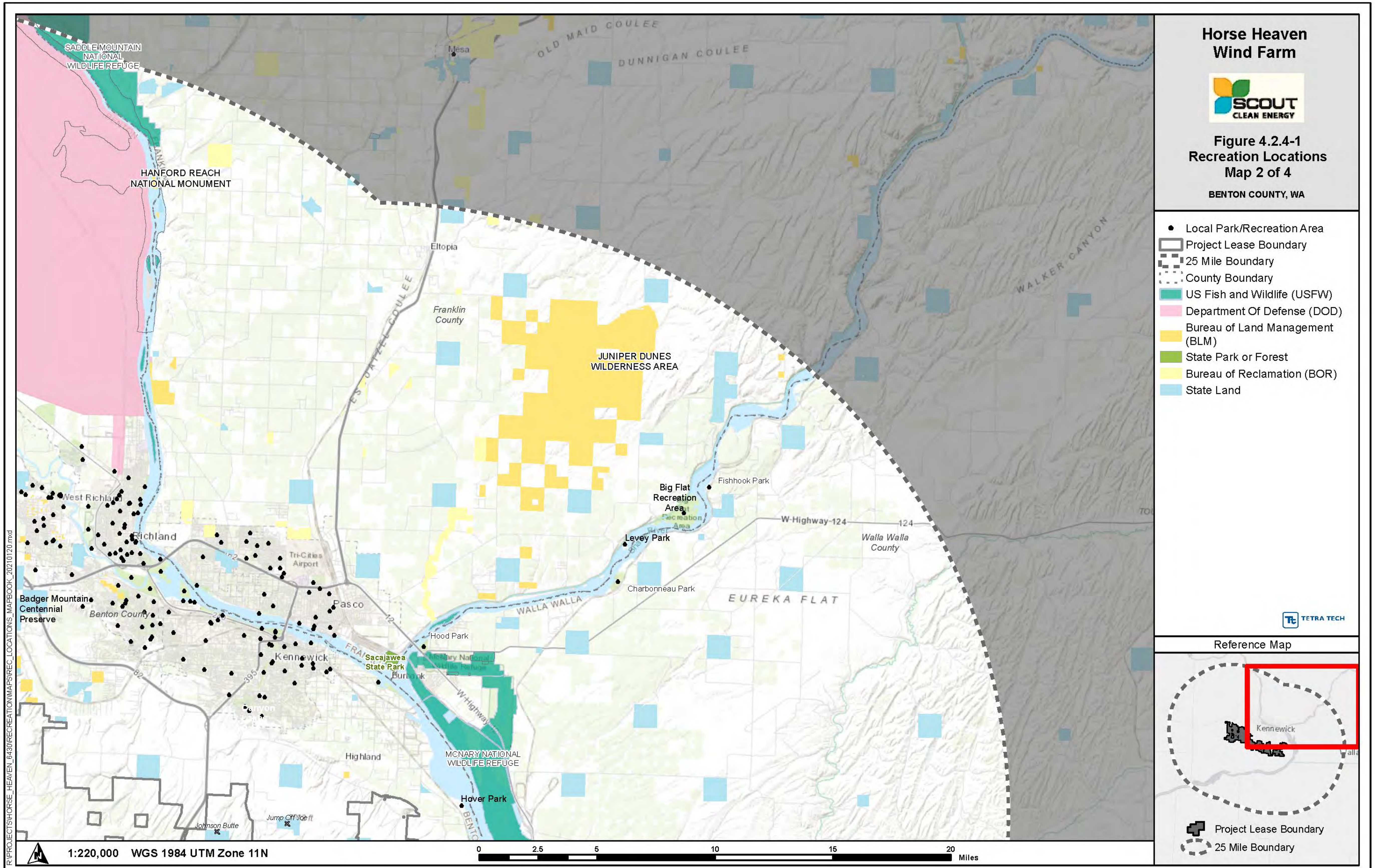
- Benton County, Washington
- Franklin County, Washington
- Yakima County, Washington
- Walla Walla County, Washington

- Klickitat County, Washington
- Morrow County, Oregon
- Umatilla County, Oregon

These lands offer recreational opportunities, including parks and places for camping, hiking, hunting, fishing, boating, swimming, wildlife viewing (including bird watching), and recreational sports (e.g., paragliding). Activities related to each recreation site are discussed in the next sections under each land use administrator. **Figures 3.12-1 through 3.12-4** show the locations of recreation resources within the study area.

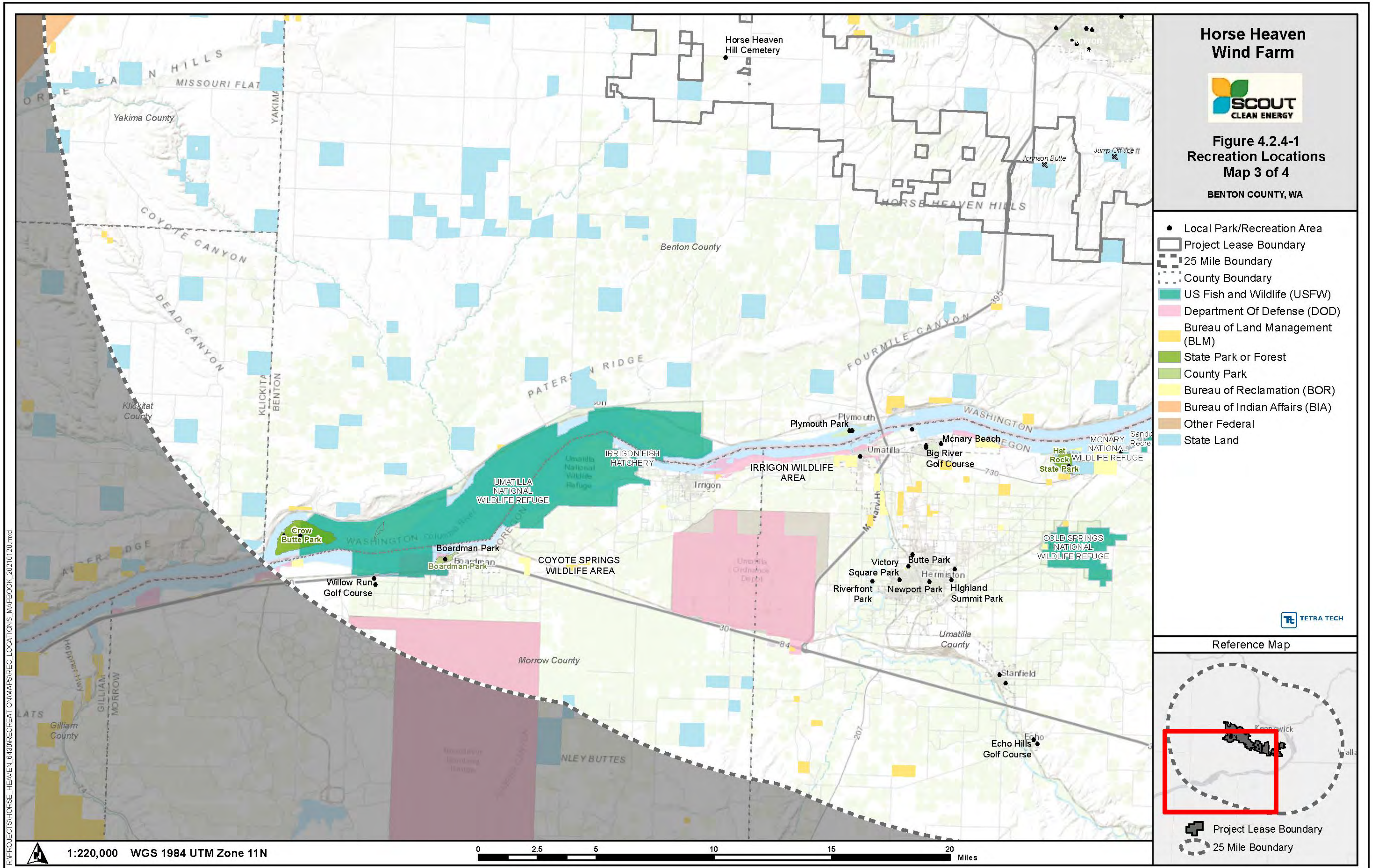


Source: Horse Heaven Wind Farm, LLC 2021a
Figure 3.12-1: Recreation Location Map 1 of 4



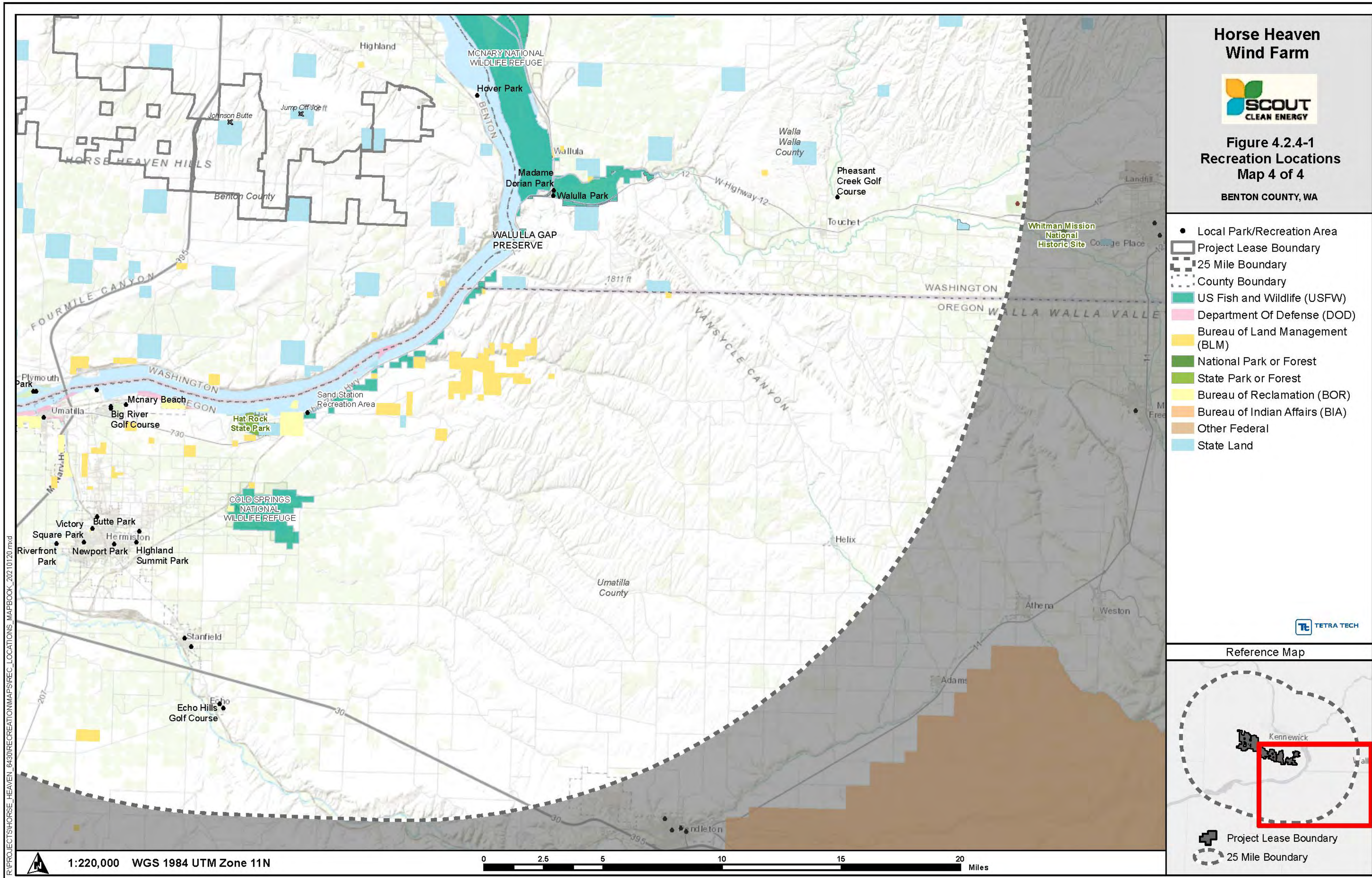
Source: Horse Heaven Wind Farm, LLC 2021a

Figure 3.12-2: Recreation Location Map 2 of 4



Source: Horse Heaven Wind Farm, LLC 2021a

Figure 3.12-3: Recreation Location Map 3 of 4



Source: Horse Heaven Wind Farm, LLC 2021a

Figure 3.12-4: Recreation Location Map 4 of 4

3.12.1.1 County and Private Resources

County and local lands in the study area that offer recreational activities include areas managed and operated by the counties and private landowners. Comprehensive plans contain general goals, policies, and objectives applicable to the recreation resources within the study area. The following comprehensive plans influence recreational activities within the study area:

- Benton County Comprehensive Plan
- Walla Walla County Comprehensive Plan
- Umatilla County Comprehensive Plan
- Morrow County Comprehensive Plan
- Yakima County Comprehensive Plan
- Kennewick Comprehensive Parks and Recreation Plan
- City of Pasco Parks, Recreation, and Forestry Plan
- City of Richland Parks and Recreation Master Plan
- Benton City Comprehensive Plan
- City of Umatilla Comprehensive Land Use Plan
- City of Boardman Comprehensive Plan
- Hermiston Parks, Recreation and Open Space Master Plan
- City of Prosser Parks and Recreation Plan
- City of Grandview Comprehensive Plan
- City of Grandview Comprehensive Parks, Recreation and Open Space Plan

The county plans all identify goals, objectives, and policies that protect and maintain resources and preservation of land use while promoting development, local coordination, and education. For example, the Benton County Comprehensive Plan encourages the retention of open space and development of recreation opportunities, conservation of fish and wildlife habitat, increased access to natural resource lands and water, and development of parks (Benton County 2021). **Table 3.12-1** summarizes the county and local recreation resources within the study area.

Table 3.12-1: County and Regional Resources and Activities within the Recreation Study Area

Recreation Resource Name[(a)]	Management	Distance from Lease Boundary (nearest point of resource)	Description
Horse Heaven Cemetery	Benton County	Within Project Lease Boundary	A 2-acre historical burial ground established in 1893 and formed as a Benton County park in 2012. Offers a small hiking trail and a historic attraction.
Hover Park	Benton County	1.5 miles east	A day-use park that offers large areas of undeveloped scenic views, wildlife viewing, fishing, and small multi-use trails.
Wallula Gap Preserve	Benton County	3 miles southeast	This National Natural Landmark is a preservation area that remains undeveloped and generally inaccessible.
Badger Mountain Centennial Preserve	Benton County	4 miles northwest	Offers large areas of undeveloped scenic views, bird watching, multi-use trails, and horseback riding.

Table 3.12-1: County and Regional Resources and Activities within the Recreation Study Area

Recreation Resource Name[(a)]	Management	Distance from Lease Boundary (nearest point of resource)	Description
Two Rivers Park	Benton County	4.5 miles northeast	Although owned by Corps of Engineers, this facility is leased to Benton County. Offers playgrounds, open space, swimming, boating, golfing, hiking, bathroom facilities, and parking. Open year round, from 6 a.m. to 10 p.m. in the summer, and during daylight hours in the winter.
Candy Mountain Preserve	Benton County	5 miles northwest	Offers large areas of undeveloped scenic views and small multi-use trails.
Vista Park	Benton County	5 miles northeast	Offers playgrounds, open space, bathroom facilities, and parking. Originally developed by the Vista Junior Women's Club in 1970, Vista is the County's smallest park.
Rattlesnake Mountain Shooting Facility	Benton County	8 miles northwest	Located on land leased by Benton County from Washington State and the BLM; offers various shooting discipline ranges. The Tri-City Shooting Association operates the Rattlesnake Mountain Shooting Facility on behalf of Benton County.
Horn Rapids Park	Benton County	9 miles northwest	An 800-acre site owned and operated by Benton County since the 1960s and the only Benton County park where overnight camping is available. In addition to the campground, Horn Rapids Park has a horse camp, model airplane facility, boat launch, and miles of multi-use trails.
Horse Heaven Vista	Benton County	7 miles west	Offers large areas of undeveloped scenic views and small hiking trails or biking.
Boardman Parks and Recreation District	Morrow County	20.1 miles southwest	A recreational area managed by Morrow County, Oregon. The site consists of over 100 acres of land available to the public and includes 5 day-use parks, boating, swimming, walking trails, and areas for RV camping.

Sources: Horse Heaven Wind Farm, LLC 2021a; Benton County n.d.
Notes:
(a) There are 208 small local parks found within the study area. These various parks are shown in **Figures 3.12-1 through 3.12-4** but are not listed individually in this table.
BLM = Bureau of Land Management; RV = recreational vehicle

The remaining recreation resources within the study area are all local facilities. Three of the 208 facilities are within 5 miles of the Lease Boundary:

- Canyon Lakes Golf Course (3.3 miles north of the Lease Boundary)
- Shark Reef Water Park (3.8 miles north of the Lease Boundary)
- Bombing Range Road Sports Complex (5 miles northeast of the Lease Boundary)

Local facilities provide recreational features, including playgrounds, fields, athletic courts, boat ramps, trails, and restrooms.

Multiple use paths are a popular feature within the study area. Badger Road runs 12 miles in Benton County, effectively connecting the Tri-City metropolitan area to Weber Canyon Road near Benton City, Washington. This route is popular with recreationists, particularly cyclists. Benton County is proposing to add two 6-foot-wide bike lanes along 7 miles of Badger Road, from the City of Kennewick to Dallas Road. Currently, several cycling organizations use this route for events. The road is also listed as a popular route on maps produced by the Benton Franklin Council of Governments. These maps also indicate that the route merits caution in its current form due to the condition of the road (e.g., lack of bike lanes) and amount of traffic (Benton County 2022).

3.12.1.2 State of Washington and Oregon Resources

State lands that offer recreational activities in the study area include:

- Washington State Department of Natural Resources
- Washington State Parks
- Oregon Parks and Recreation Department
- Oregon Department of Fish and Wildlife

Table 3.12-2 summarizes the state recreation resources within the study area.

Table 3.12-2: State Resources and Activities within the Recreation Study Area

Recreation Resource Name	Management	Distance from Lease Boundary (nearest point of resource)	Description
Johnson Butte	DNR	Within Project Lease Boundary	A low-elevation mountain peak that offers unofficial hiking opportunities, as well as paragliding launch points.
Jump Off Joe Butte	DNR	1.5 miles east	A low-elevation mountain peak that offers unofficial hiking opportunities, as well as paragliding launch points.
Chandler Butte	DNR	1.8 miles northwest	A low-elevation mountain peak that offers unofficial hiking opportunities, as well as paragliding launch points.
Goose Hill Butte	DNR	2 miles northwest	A low-elevation mountain peak that offers unofficial hiking opportunities, as well as paragliding launch points.
Sacajawea Historical State Park	Washington State Parks	5.2 miles north	A 267-acre day-use park with hiking trails, restroom facilities, boating, and camping activities.
Hat Rock State Park	OPRD	8.1 miles south	A day-use area offering picnicking sites, wildlife viewing, fishing, boating, hiking, and restroom facilities on the south shore of Lake Wallula.
Irrigon Wildlife Area	ODFW	11 miles southwest	Part of the greater Columbia Basin Wildlife Area, Irrigon is a 979-acre day-use site for hunting, fishing, wildlife viewing and some accommodations for camping.

Table 3.12-2: State Resources and Activities within the Recreation Study Area

Recreation Resource Name	Management	Distance from Lease Boundary (nearest point of resource)	Description
Coyote Springs Wildlife Area	ODFW	21 miles southwest	Part of the greater Columbia Basin Wildlife Area, the Coyote Springs Wildlife Area encompasses approximately 160 acres and offers day-use activities, including hunting, with some accommodations for camping.

Sources: ODFW 2008, 2022; Horse Heaven Wind Farm, LLC 2021a; DNR 2022; OSP 2022; Washington State Parks n.d.(a), n.d.(b)
Notes:
The DNR also manages lands within the Lease Boundary that are accessible for public hunting. The Washington Department of Fish and Wildlife oversees game management units on DNR-managed lands.
DNR = Washington State Department of Natural Resources; ODFW = Oregon Department of Fish and Wildlife; OPRD = Oregon Parks and Recreation Department

Paragliding and Hang Gliding

Hang gliding, paragliding, and cross-country parasailing occur at approximately 20 locations within the study area on both state and federally managed lands, as shown in **Figure 3.12-5**. Launch sites nearest to the Lease Boundary follow Kiona Ridge (officially known as Chandler Butte), McBee Road, and starting to the west of the Bureau of Land Management (BLM)-administered McBee Trailhead. It is estimated that roughly 100 individuals may launch from Kiona Ridge in a year (Horse Heaven Wind Farm, LLC 2021b). Flights from Kiona Ridge are logged voluntarily by pilots using a global flight database, which shows 300 flights since 2010 from Kiona Ridge with a variety of flight paths and landing locations (Paragliding Forum n.d.). Both federal and state agencies are aware that paragliders and hang gliders launch from lands near the Lease Boundary, and no permit is required so long as it is “casual use” (Smith 2021). From Kiona Ridge, gliders typically launch south and land north of the ridge, although landing sites can cross the Lease Boundary. Depending on wind and weather conditions, cross-country gliders can fly to the Columbia River and across into Oregon.

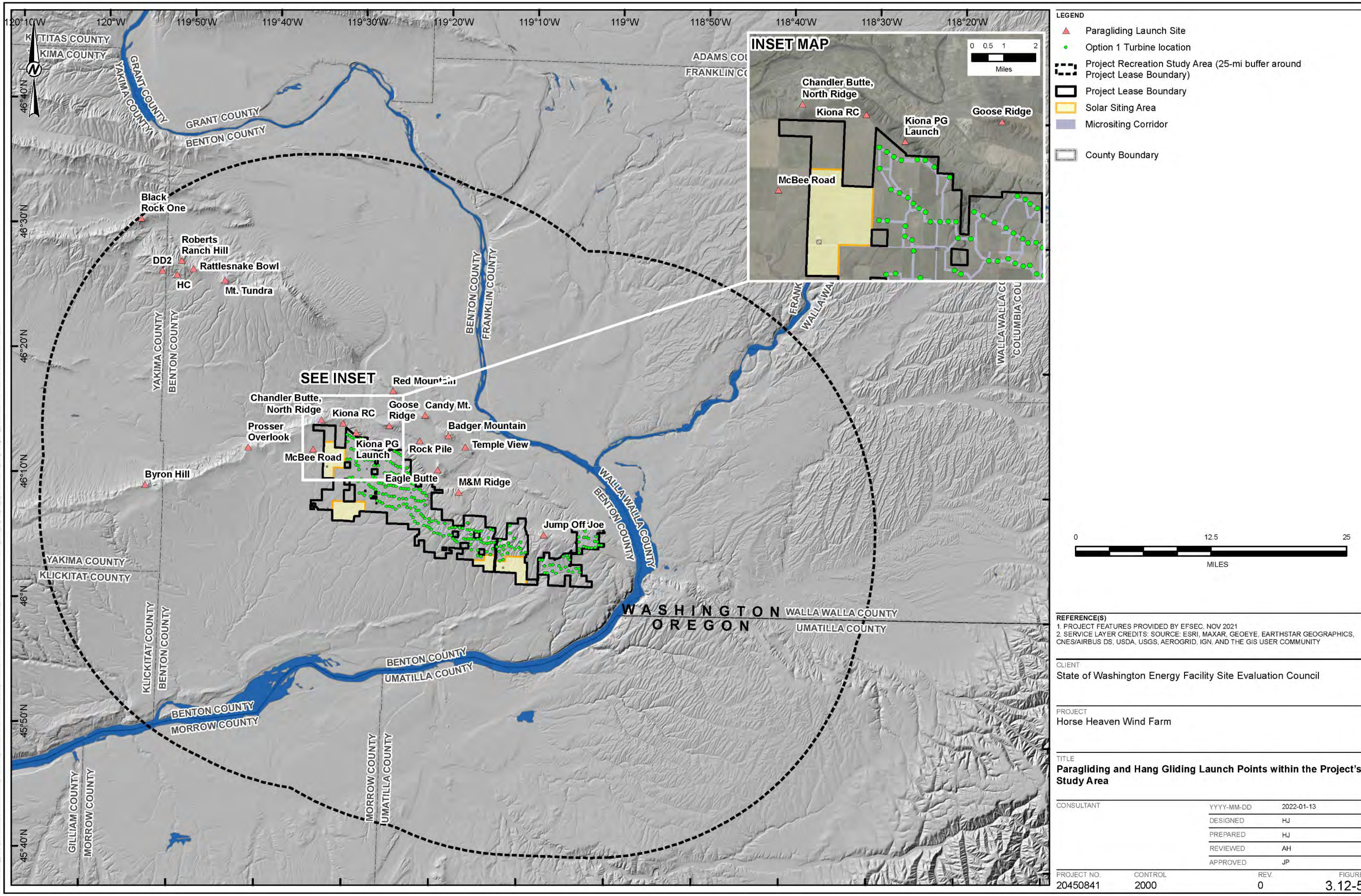


Figure 3.12-5: Paragliding and Hang Gliding Launch Points within the Recreation Study Area

3.12.1.3 Federal Resources

This section reviews recreational areas designed, constructed, designated, or used for recreational activities. This assessment does not include protected lands held for potential mining and logging use or restricted lands, although these lands may be used by recreationists (hunters, fishermen, etc.). Federal lands that offer recreational activities include the lands administered by the BLM, U.S. Fish and Wildlife Service, National Park Service, and U.S. Army Corps of Engineers. **Table 3.12-3** summarizes the federal recreation resources within the study area. Land within the study area is identified by BLM public data as "an undeveloped watchable wildlife and watchable wildflowers area. Popular with locals, it is primarily used for hiking, nature viewing, photography, and mountain biking" (BLM n.d.).

Table 3.12-3: Federal Resources and Activities Publicly Accessible within the Study Area

Recreation Resource Name	Management	Distance from Lease Boundary (nearest point of resource)	Description
Ice Age Floods National Geologic Trail	NPS	Varies[(a)]	Details regarding routes and features provided in **Table 3.12-2**.
Hood Park	USACE	6.5 miles northeast	A campground that offers boating, fishing, and swimming activities.
Sand Station Recreation Area (Lake Wallula)	USACE	8 miles south	A day-use facility that offers boating, fishing, and swimming activities.
Charbonneau Park	USACE	12.5 miles northeast	A campground that offers boating, fishing, and swimming activities.
Fishhook Park	USACE	18.5 miles northeast	A campground that offers boating, fishing, and swimming activities.
Crow Butte Park	USACE	22.2 miles southwest	A campground that offers boating, fishing, and swimming activities.
McNary National Wildlife Refuge	USFWS	2.7 miles east	A day-use facility, except as modified by fishing and hunting regulations. Recreational activities include fishing, hunting, watching wildlife, and hiking.
Saddle Mountain National Wildlife Refuge	USFWS	8.7 miles north	A day-use facility, except as modified by fishing and hunting regulations. Recreational activities include fishing, hunting, watching wildlife, and hiking.
Cold Springs National Wildlife Refuge	USFWS	11.3 miles south	A day-use facility, except as modified by fishing and hunting regulations. Recreational activities include fishing, hunting, watching wildlife, and hiking.

Table 3.12-3: Federal Resources and Activities Publicly Accessible within the Study Area

Recreation Resource Name	Management	Distance from Lease Boundary (nearest point of resource)	Description
Umatilla National Wildlife Refuge	USFWS	11.4 miles southwest	A day-use facility, except as modified by fishing and hunting regulations. Recreational activities include fishing, hunting, watching wildlife, and hiking.
Irrigon Fish Hatchery	USFWS	13.9 miles south	A day-use facility, except as modified by fishing and hunting regulations. Recreational activities include fishing, hunting, watching wildlife, and hiking.
Hanford Reach National Monument	USFWS	14.3 miles north	A day-use facility, except as modified by fishing and hunting regulations. Recreational activities include fishing, hunting, watching wildlife, and hiking.
Sunnyside Wildlife Management Area	USFWS	15 miles west	A day-use facility, except as modified by fishing and hunting regulations. Recreational activities include fishing, hunting, watching wildlife, and hiking.
Washington Farm Service Agency Tracts	USFWS	24.7 miles west	A day-use facility, except as modified by fishing and hunting regulations. Recreational activities include fishing, hunting, watching wildlife, and hiking.
McBee Trailhead (Horse Heaven Hills)	BLM	1.5 miles northwest	A non-designated hiking and biking trail adjacent to the Project's Lease Boundary. Paragliding and hang gliding are known to occur near this location.
Juniper Dunes OHV Area / ACEC Wilderness Area	BLM	15.3 miles northeast	A BLM-administered, 19,600-acre land package that comprises 3,920 acres of loose-sand riding for OHVs.

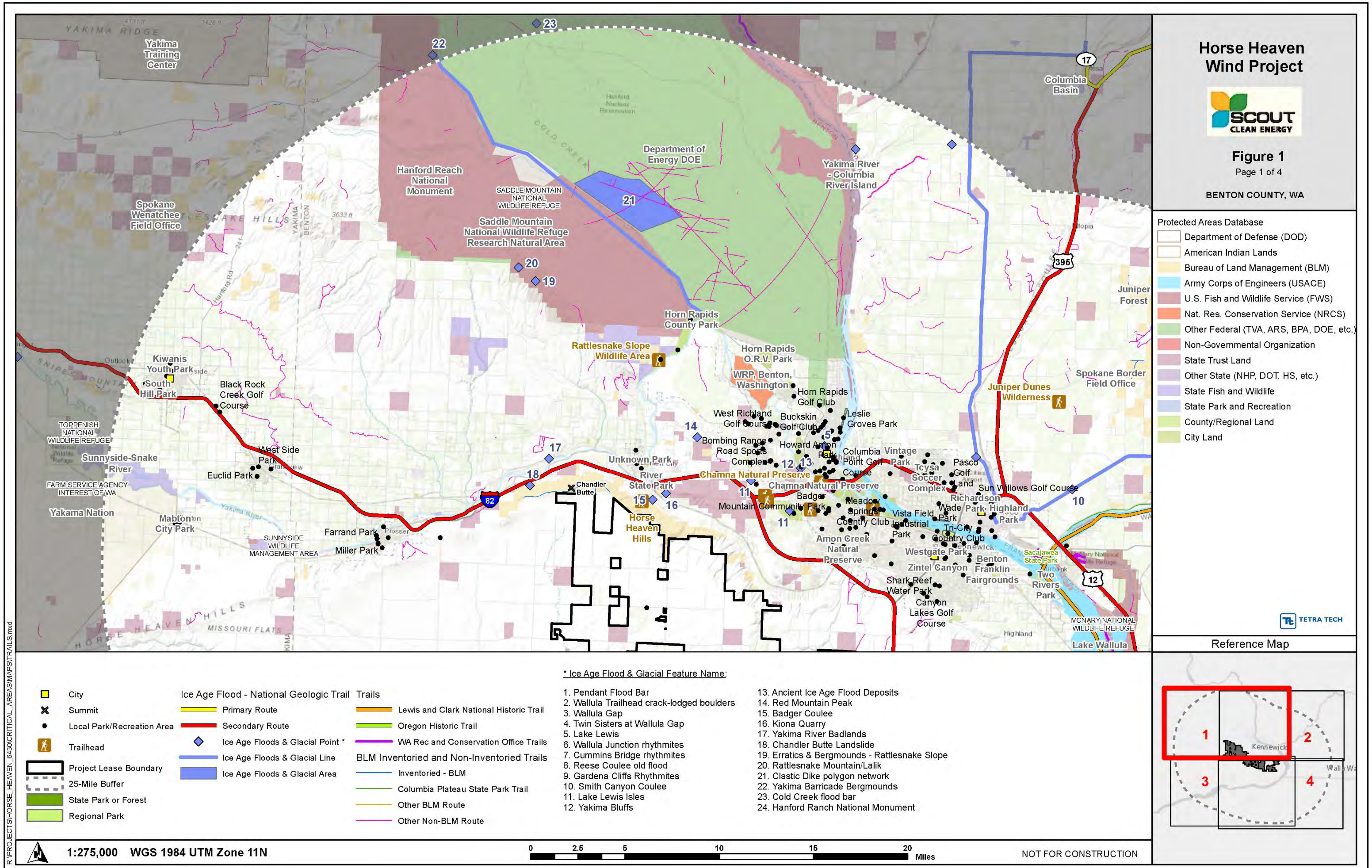
Sources: USFWS 2013a, 2013b, 2013c, 2014; Horse Heaven Wind Farm, LLC 2021a; BLM n.d.; USACE n.d.(a), n.d.(b), n.d.(c), n.d.(d)
Notes:
[a] Features of the Ice Age Floods National Geologic Trail within the study area are further detailed in **Table 3.12-4.**
ACEC = Area of Critical Environmental Concern; BLM = Bureau of Land Management; OHV = off-highway vehicle; USACE = U.S. Army Corps of Engineers; USFWS = U.S. Fish and Wildlife Service

Ice Age Floods National Geologic Trail (IAF-NGT)

The IAF-NGT is a network of geological features left behind by a series of cataclysmic floods that occurred at the end of the most recent Ice Age, when glacially dammed lakes ruptured and large volumes of water rushed through the northwestern United States (NPS 2014; IAFI 2021). Although there are no IAF-NGT routes or features within the Lease Boundary, there are primary and secondary routes and features within the study area. The primary and secondary IAF-NGT routes and features within the study area are shown in **Figures 3.12-6 through 3.12-9.**

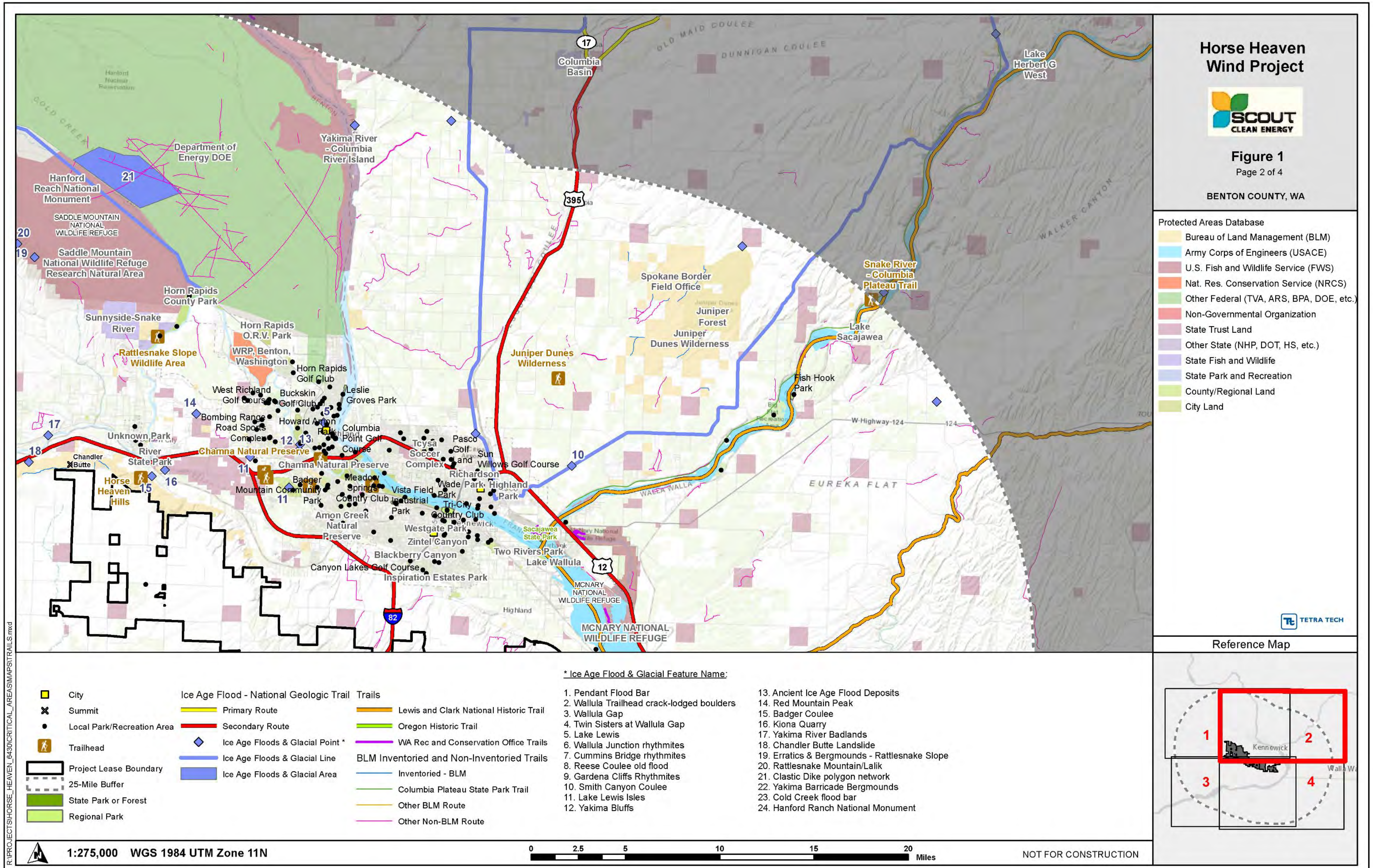
The route of the trail, designated by the Omnibus Public Land Management Act of 2009, encompasses several federal and state highways, National Scenic Byways, and multiple loops and spurs across a vast, varied landscape with more than 350 sites and features created by the Ice Age floods (NPS 2014).

This Page Intentionally Left Blank



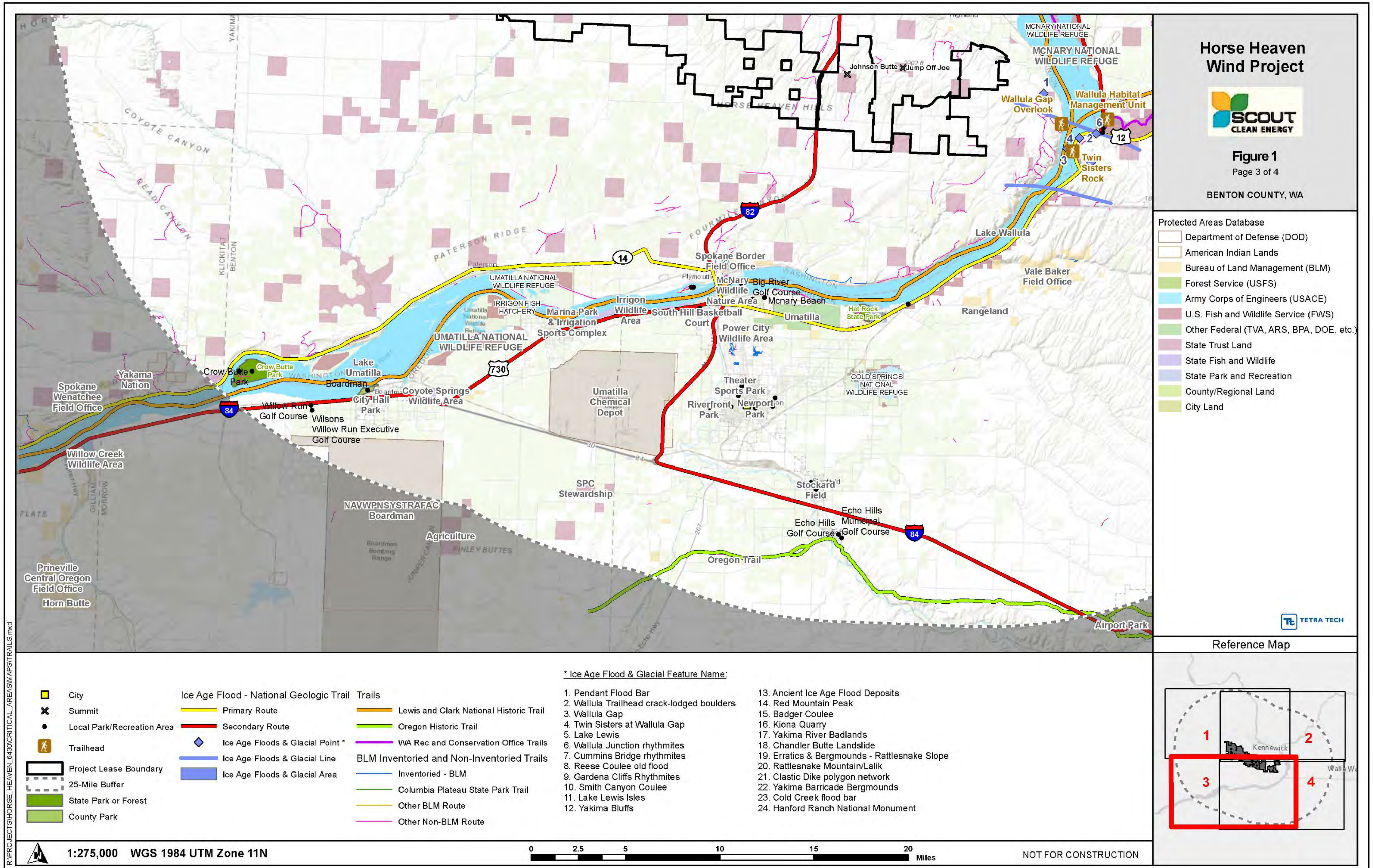
Source: Horse Heaven Wind Farm, LLC 2021c

Figure 3.12-6: IAF-NGT Features within the Study Area, Map 1 of 4



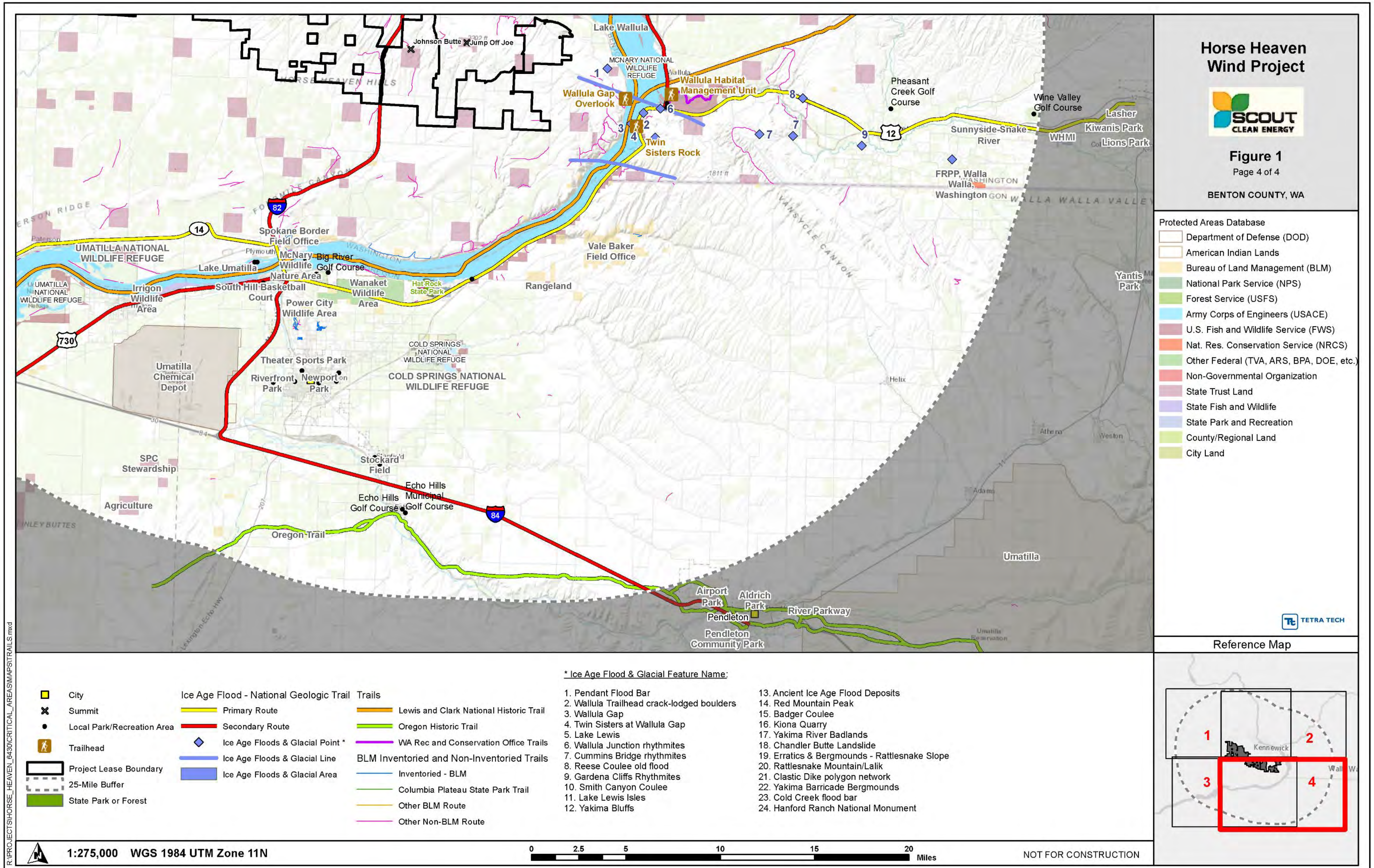
Source: Horse Heaven Wind Farm, LLC 2021c

Figure 3.12-7: IAF-NGT Features within the Study Area, Map 2 of 4



Source: Horse Heaven Wind Farm, LLC 2021c

Figure 3.12-8: IAF-NGT Features within the Study Area, Map 3 of 4



Source: Horse Heaven Wind Farm, LLC 2021c

Figure 3.12-9: IAF-NGT Features within the Study Area, Map 4 of 4

The pathways of these floods extend more than 1,300 linear miles across the region. They begin in the intermountain valleys of western Montana and traverse northern Idaho, central and eastern Washington, and northern Oregon to the coast near Cape Disappointment. The IAF-NGT is one of the few national trails in the United States that focuses on natural, rather than human, history (NPS 2014). The IAF-NGT routes and features and their distances from the Lease Boundary are shown in **Table 3.12-4**.

Table 3.12-4: Ice Age Floods National Geologic Trail Resources within the Recreation Study Area

Feature #[(a)]	IAF-NGT Features within Study Area	Approximate Distance from Lease Boundary (miles)
1	Pendant Flood Bar	1.97
2	Wallula Trailhead crack-lodged boulders	4.73
3	Wallula Gap	4.29
4	Twin Sisters at Wallula Gap	4.61
5	Lake Lewis	7.67
6	Wallula Junction rhythmites	5.37
7	Cummins Bridge rhythmites	10.72
8	Reese Coulee old flood	12.44
9	Gardena Cliffs Rhythmites	16.06
10	Smith Canyon Coulee	9.48
11	Lake Lewis Isles	4.09
12	Yakima Bluffs	5.96
13	Ancient Ice Age Flood Deposits	5.74
14	Red Mountain Peak	4.83
15	Badger Coulee	0.84
16	Kiona Quarry	1.42
17	Yakima River Badlands	1.87
18	Chandler Butte Landslide	1.46
19	Erratics & Bergmounds - Rattlesnake Slope	11.32
20	Rattlesnake Mountain / Lalik	12.15
21	Clastic Dike polygon network	14.17
22	Yakima Barricade Bergmounds	24.17
23	Cold Creek flood bar	24.96
24	Hanford Ranch National Monument	8.52

Source: Horse Heaven Wind Farm, LLC 2021c
Notes: (a) As depicted in Figures 3.12-6 through 3.12-9
IAF-NGT= Ice Age Flood National Geologic Trail

The IAF-NGT feature nearest to the Lease Boundary is Badger Coulee, located approximately 0.84 miles north. The Badger Coulee feature is a 15-mile-long valley, a former course of the Yakima River before the Ice Age flood deposits. Other features near the Lease Boundary are the Kiona Quarry, Yakima River Badlands, Chandler Butte Landslide, and Pendant Flood Bar. The IAF-NGT secondary route of Interstate 82 bisects the eastern portion of the Lease Boundary.

This Page Intentionally Left Blank

3.13 Public Health and Safety

This section describes existing public health and safety resources in the proposed Horse Heaven Wind Farm (Project, or Proposed Action) vicinity. This evaluation of public health and safety resources was prepared in alignment with Washington Administrative Code 463-60-352 and focuses on the availability of public service agencies and medical facilities (e.g., law enforcement, fire protection, and medical emergency services) within the vicinity of the Project Lease Boundary. Potential impacts on identified public health and safety resources are evaluated in Section 4.13.

3.13.1 Relevant Data Sources

The following sources were used in this evaluation of public health and safety resources:

- Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification (ASC) 2021 (Horse Heaven Wind Farm, LLC 2021)
- Benton County, Washington, Natural Hazard Mitigation Plan 2019 Revision (Northwest Management, Inc. 2019)
- Benton County, Washington, official website: https://www.co.benton.wa.us/default.aspx

3.13.2 Affected Environment

The Lease Boundary is located in Benton County, which is in southeastern Washington State. The Columbia River bounds Benton County to the north, east, and south, while Klickitat and Yakima Counties bound Benton County to the west. The county is predominantly rural and agricultural, with unincorporated areas making up most of the jurisdiction. The Lease Boundary lies south of the Tri-Cities—Kennewick, Pasco, and Richland, Washington. The Project would be situated on vacant land with dryland vegetation cover and few trees. Limited areas within the Lease Boundary contain historically recognized hazardous conditions, which have been cleaned up to the satisfaction of applicable agencies (see Appendix C of the ASC) and would be avoided during construction. The Williams Northwest Pipeline (an underground interstate gas transmission pipeline) traverses the Lease Boundary. Turbines and the solar array would be set back from this pipeline. At a minimum, Project elements would be located outside the pipeline right-of-way, which extends 55 feet to the east and 20 feet to the west of the pipeline. Construction of the Project would not impact the pipeline's operations. Underground collector lines and communications (supervisory control and data acquisition [SCADA]) for the Project would cross above the pipeline, and Horse Heaven Wind Farm, LLC (Applicant), would coordinate with Williams (the pipeline owner and operator) on construction specifications and would obtain their approval prior to crossing the pipeline.

The following sections describe the authorities or entities tasked with ensuring public health and safety in the Lease Boundary vicinity within Benton County.

3.13.2.1 Public Services

Emergency Management Services

Benton County Emergency Services is made up of two divisions: the Southeast Communications Center (SECOMM) and Benton County Emergency Management (BCEM). The two divisions assist emergency responders and promote community safety (Benton County n.d.).

- **SECOMM**: SECOMM's responsibilities include providing dispatch services to all law enforcement, fire and emergency management services, and emergency response agencies (including 9-1-1 response) within

Benton and Franklin Counties. SECOMM is the 9-1-1 dispatch center for the following emergency service agencies in the vicinity of the Lease Boundary:

- Kennewick Police and Fire
- Richland Police and Fire
- Pasco Police and Fire
- Benton County Sheriff's Office
- Benton County Fire Protection Districts 1, 2, 4, 5, and 6

■ **BCEM**: The primary responsibility of BCEM is to minimize the impact of disasters on the people, property, economy, and environment of Benton County. BCEM's activities include comprehensive disaster planning, preparedness education, training, and resource coordination. In addition to hazards such as wildfires and floods, BCEM plans and prepares for emergencies at the Hanford decommissioned nuclear production site and the Columbia Generating Station.

Law Enforcement

Law enforcement comprises the agencies and employees responsible for enforcing laws, maintaining public order, and managing public safety. The primary duties of law enforcement include the investigation, apprehension, and detention of individuals suspected of criminal offenses. The following state and local agencies have law enforcement service areas covering the Lease Boundary vicinity:

■ **Benton County Sheriff's Office**: The Benton County Sheriff's Office Bureau of Law Enforcement is made up of 60 commissioned deputies and 10 non-commissioned employees. The Patrol Division consists of a Patrol Lieutenant overseeing 34 deputies and is responsible for providing an initial response to all requests for service received by the Sheriff's Office. The Patrol Division also performs the following:

- Conducts the initial investigation of all reported crimes within the agency's jurisdiction
- Conducts traffic enforcement and traffic accident investigations
- Provides emergency response to assist with natural and human-caused disasters, often in conjunction with other area law enforcement and fire rescue agencies

The Detective Division handles all major crime investigations within the Sheriff's Office's jurisdiction and internal investigations into the conduct of the Sheriff's deputies. The Civil Division processes and serves court papers, and the Records Division processes the investigative reports prepared by the Patrol Division.

■ **Kennewick Police Department**: The Kennewick Police Department has a Patrol Division with four 12-officer squads that provide professional law enforcement services to the community. These services include crimes in progress, investigations, traffic enforcement, and other emergency and non-emergency calls. The Criminal Investigation Division is responsible for investigating felony crimes and high-profile cases (including, but not limited to, homicides, assaults, armed robberies, arsons, burglaries, kidnappings, internet crimes, auto thefts, identity theft, and other felony crimes). The Administrative Services Division is responsible for employment (in conjunction with the City's Human Resources Department), training, internal affairs, and animal control authority, among other administrative services.

- **Washington State Patrol District 3:** District 3 comprises the seven southeastern counties of Washington State (including Yakima, Benton, and Franklin counties), covering over 900 miles of state and interstate highways, and shares borders with Oregon and Idaho. More than 140 employees are assigned, providing an array of law enforcement and investigation services. District 3 operates from four detachment offices across the state, the closest of which is in Kennewick.

Fire Protection

The five incorporated communities and portions of the remaining unincorporated area of Benton County are served by municipal and rural fire departments. Richland and Kennewick municipal fire departments are operated by full-time fire personnel. Prosser, Benton City, and West Richland operate with full and part-time positions, along with volunteer staff. The unincorporated areas of Benton County are served by six fire districts that are primarily staffed by volunteer personnel.

The Lease Boundary primarily falls within the jurisdiction of Fire Districts #1 and #5.

- **Benton County Fire District #1**: Fire District #1 protects an area of approximately 320 square miles south of Kennewick, Richland, and West Richland and serves a population of approximately 17,500 residents, including the communities of Finley, South Kennewick, El Rancho Reata, and Badger Canyon. Through a Cooperative Agreement with the Bureau of Land Management (BLM) Spokane District, the Fire District also responds with fire suppression forces to 66,742 acres of BLM land in Benton, Franklin, and Yakima Counties. Within District #1 are residential areas, commercial and industrial complexes, educational facilities, agricultural areas, wildland areas, and zones of interfaces between urban and wildland/agriculture uses. District #1 has 13 career staff and 90 dedicated volunteer firefighters, officers, emergency medical technicians, first responders, and support personnel serving out of six fire stations. District #1 averages 1,350 calls for service each year, 55 percent of which are for emergency medical services and the remainder for fire. The potential for District #1 to experience a substantial wildland fire is high.
- **Benton County Fire District #5**: Benton County Fire District #5 covers an area of approximately 400 square miles and is primarily a wildland fire agency, with some urban/suburban interface with neighboring agencies. Fire District #5 also responds to vehicle accidents and provides some non-ambulance emergency medical services but relies on neighboring fire agencies for structure firefighting. District #5 operates out of four main stations with approximately 20 volunteers.

Both districts are part of the Tri-County Master Mutual Aid Agreement, including all fire departments and fire districts within Benton, Franklin, and Walla Walla Counties. Mutual aid agreements allow a jurisdiction to provide resources, facilities, services, and other required support to another jurisdiction during an incident (for example, Franklin County Fire District 3 responds to calls for wildland fires in Franklin County and across the Tri-Cities).

3.13.2.2 Health Services

Benton County residents receive in-patient care at three general hospitals in Kennewick, Prosser, and Richland. The Lease Boundary vicinity falls within the jurisdiction of the Kennewick and Prosser Hospital Districts. A Hospital District directed by elected board members operates each of the Kennewick and Prosser hospitals.

- The Kennewick Hospital District provides healthcare services for its district or service area by contracting these services from RCCH Health Care Partners/Trios (RCCH). RCCH operates two hospitals and several related facilities in Kennewick. The two hospitals are the 74-bed Trios Southridge Hospital, which opened in 2014, and the older 37-bed Trios Women’s and Children’s Hospital. Classified as a Level III Adult Trauma

Center, Trios Southridge Hospital offers 24-hour emergency room services, seven days a week, with 27 emergency treatment rooms. Emergency departments are designated by the resources they have available to treat cases of traumatic injury. A Level III designation means that the department can provide prompt assessment, resuscitation, surgery, intensive care, and stabilization of injured patients.

- Prosser Memorial Hospital is a critical access hospital with 25 beds. Classified as a Level IV Adult Trauma Center, Prosser Memorial Hospital offers 24-hour emergency room services seven days a week. A Level IV designation means that the department can provide advanced life support measures to stabilize a trauma patient enough to be transported to another facility, if necessary. Prosser Memorial Hospital's emergency medical services team provides western Benton County with primary 911 emergency treatment and ambulance transportation to local area hospitals.
- Kadlec Regional Medical Center, located in Richland, is a regional medical center with 270 beds. Classified as a Level III Adult Trauma Center, the center offers 24-hour emergency room services seven days a week. The Richland hospital is a not-for-profit, private corporation governed by local volunteer trustees.

Benton County is also served by public and private medical clinics that provide treatment for most medical issues. In neighboring Franklin County, Lourdes Medical Center is a critical access hospital with 35 beds. Classified as a Level IV Adult Trauma Center, Lourdes Medical Center offers 24-hour emergency room services seven days a week.

3.14 Transportation

This section describes the traffic and transportation systems in the study area of the proposed Horse Heaven Wind Farm (Project, or Proposed Action). The study area for the transportation analysis includes roadway intersections, railroad mainlines, and marine terminal facilities in the vicinity of the Project, which is defined as approximately 4 miles south/southwest of the city of Kennewick, Washington, and the larger Tri-Cities urban area along the Columbia River. Conditions of transportation systems beyond the Washington border, including the conditions of Interstate 84, are not included in this assessment. Section 4.14 assesses impacts of the Project or No Action Alternative on transportation systems.

Regulatory Setting

Washington Administrative Code 463-60-372 sections (1) through (6) require that an applicant provide information for site certification pertaining to:

- Transportation systems
- Vehicular traffic
- Waterborne, rail, and air traffic
- Parking
- Movement/circulation of people or goods
- Traffic hazards

3.14.1 Affected Environment

Washington is an economic gateway state, connecting Asian markets to U.S. industries, Alaska to the continental United States, and Canada to the U.S. West Coast. Imports to Washington support U.S. manufacturers and provide goods to consumers, while agricultural exports support family farms throughout the Pacific Northwest and Midwest. Goods coming into Washington by container ship often go to the Midwest and East Coast.

Regional economies in Washington—and their manufacturing, agriculture, construction, and forestry components—depend on an effective and efficient freight transportation system. Businesses in Washington rely on the freight system to ship their products to local customers in the state, U.S. markets in California and on the East Coast, and worldwide. Freight-dependent industries provide 46 percent of all jobs in Washington (WSDOT 2017). These jobs occur in the most heavily freight-dependent industry sectors such as wholesale and retail, manufacturing, construction, agriculture, and transportation. These sectors rely on the multimodal freight network to conduct day-to-day business.

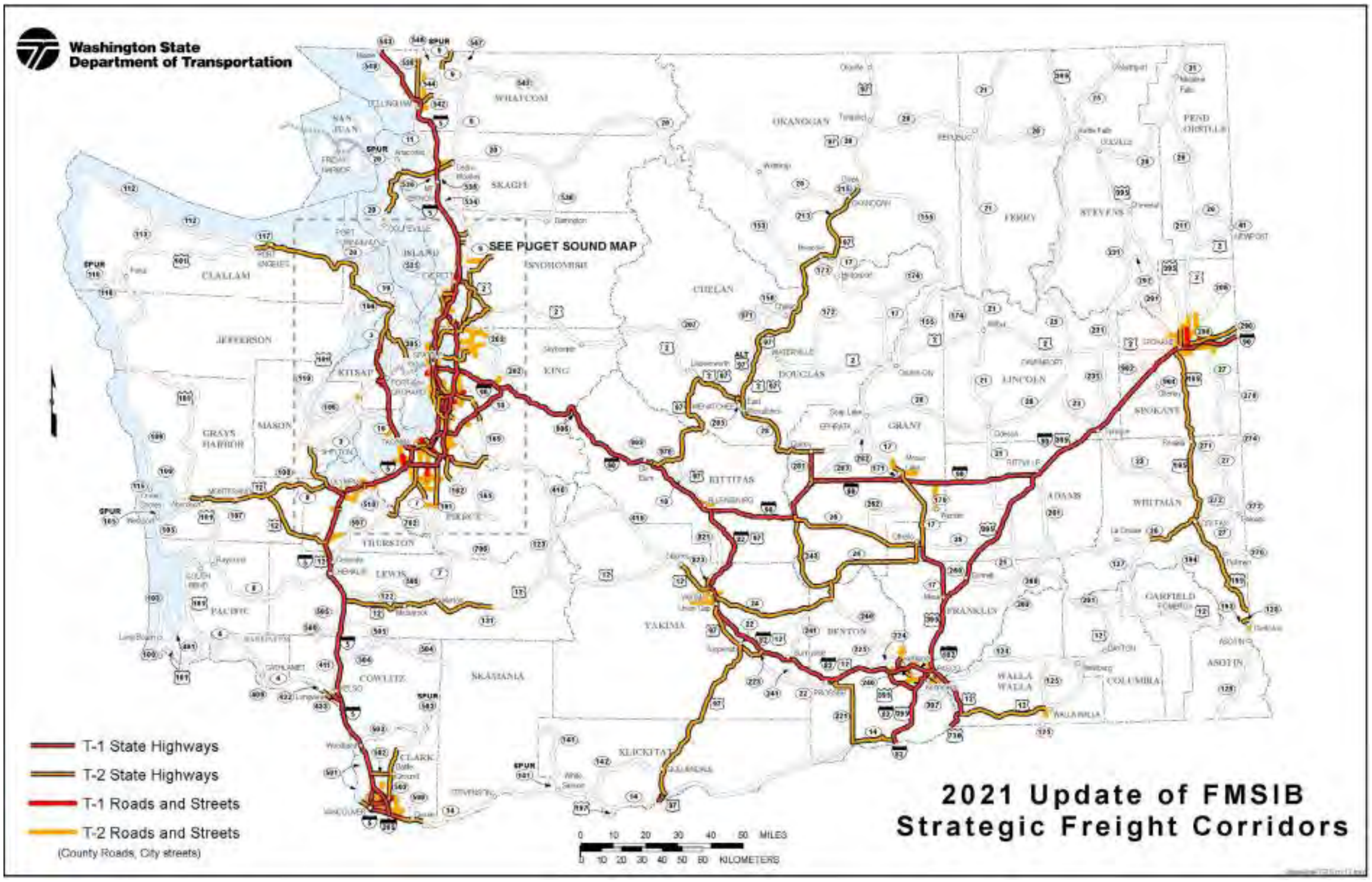
The 2021 Freight and Goods Transportation System (FGTS) classifies freight corridors by modes in Washington State based on annual freight tonnage moved, including truck, rail, and waterway freight corridors (WSDOT 2021a). Each modal network is classified into five tiers, and the specific annual tonnage thresholds for freight moved are described below:

- FGTS truck corridors are categorized as follows:
  - T-1 corridors: more than 10 million tons
  - T-2 corridors: 4 million to 10 million tons

  - T-3 corridors: 300,000 to 4 million tons
  - T-4 corridors: 100,000 to 300,000 tons
  - T-5 corridors: at least 20,000 tons in 60 days and less than 100,000 tons per year

Both T-1 and T-2 corridors are shown in **Figure 3.14-1**.

- FGTS rail corridors are categorized as follows:
  - R-1 corridors: more than 5 million tons
  - R-2 corridors: 1 million to 5 million tons
  - R-3 corridors: 500,000 to 1 million tons
  - R-4 corridors: 100,000 to 500,000 tons
  - R-5 corridors: Less than 100,000 tons
- FGTS waterway corridors are categorized as follows:
  - W-1 corridors: more than 25 million tons
  - W-2 corridors: 10 million to 25 million tons
  - W-3 corridors: 5 million to 10 million tons
  - W-4 corridors: 2.5 million to 5 million tons
  - W-5 corridors: 0.9 million to 2.5 million tons



Source: WSDOT 2021b

Figure 3.14-1: Statewide Map of 2021 T-1 and T-2 Truck Freight Corridors

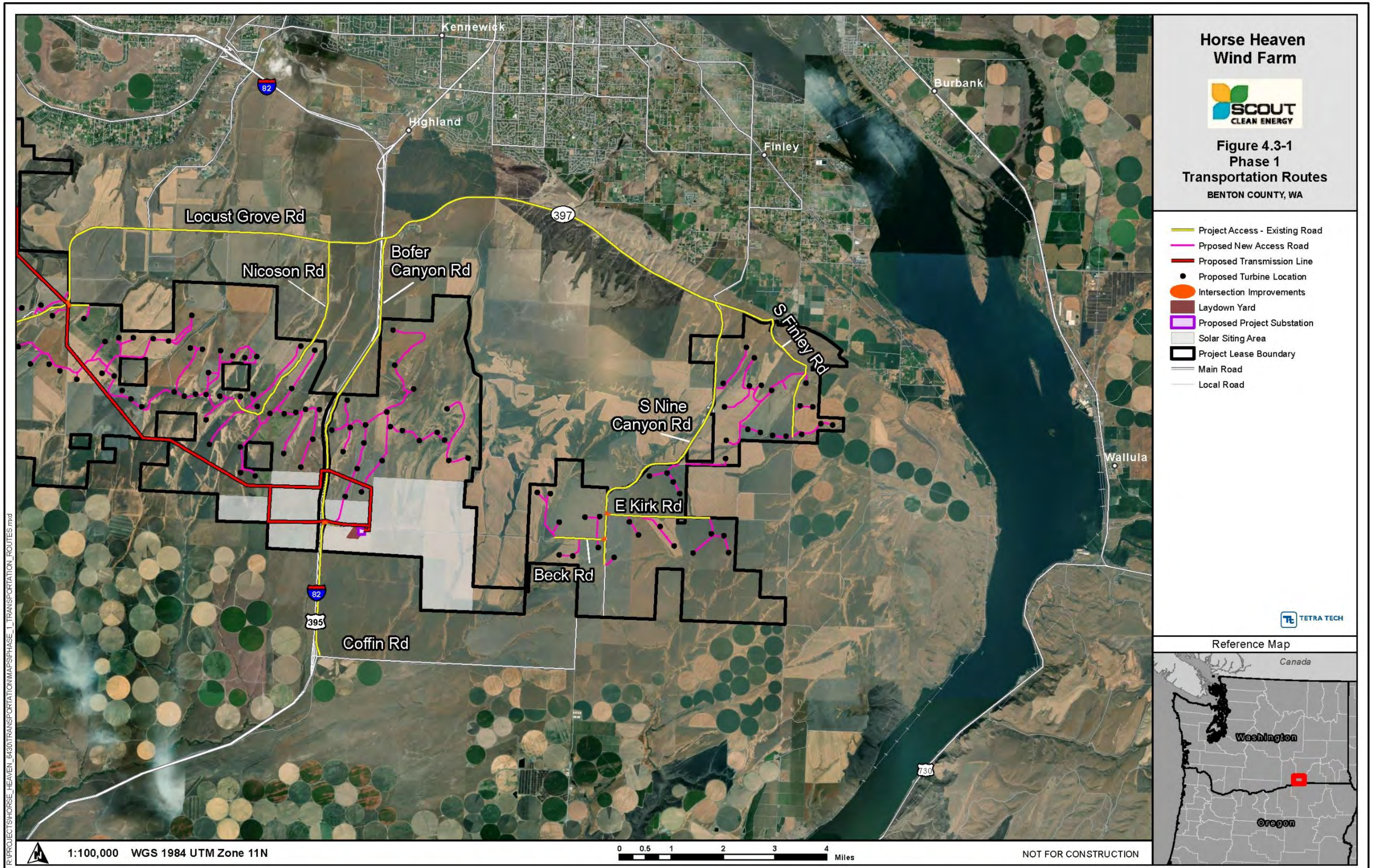
The Project would occupy two non-contiguous areas making up the Project's Lease Boundary, bisected by Interstate 82 (I-82), a T-1 Corridor. Each area would utilize a different set of local roads and constructed access roads for interior access; however, both areas would be served by I-82 as the primary inbound route for materials. All equipment is anticipated to be delivered from the south to the Project location during construction and decommissioning. From I-82, State Route 397—a T-3 Corridor—and county two-lane roads would be used to access the eastern portion of the Lease Boundary. From I-82, State Route 221—a T-2 corridor—and county roads would be used to access the western portion of the Lease Boundary.

Workers would arrive from multiple locations during construction, operation, and decommissioning. The Proposed Action in the context of the Applicant's example in the Application for Site Certification (ASC) is a phased approach to construction, described:

- Phase 1 construction could generate power via wind and solar. Phase 1 could also include a battery energy storage system (BESS) capable of storing energy.
- Phase 2 construction is divided into Phase 2a and Phase 2b, summarized as follows:
    - Phase 2a could consist of the construction of both wind and solar facilities. The Applicant's Phase 2a scenario also includes the construction of a BESS.

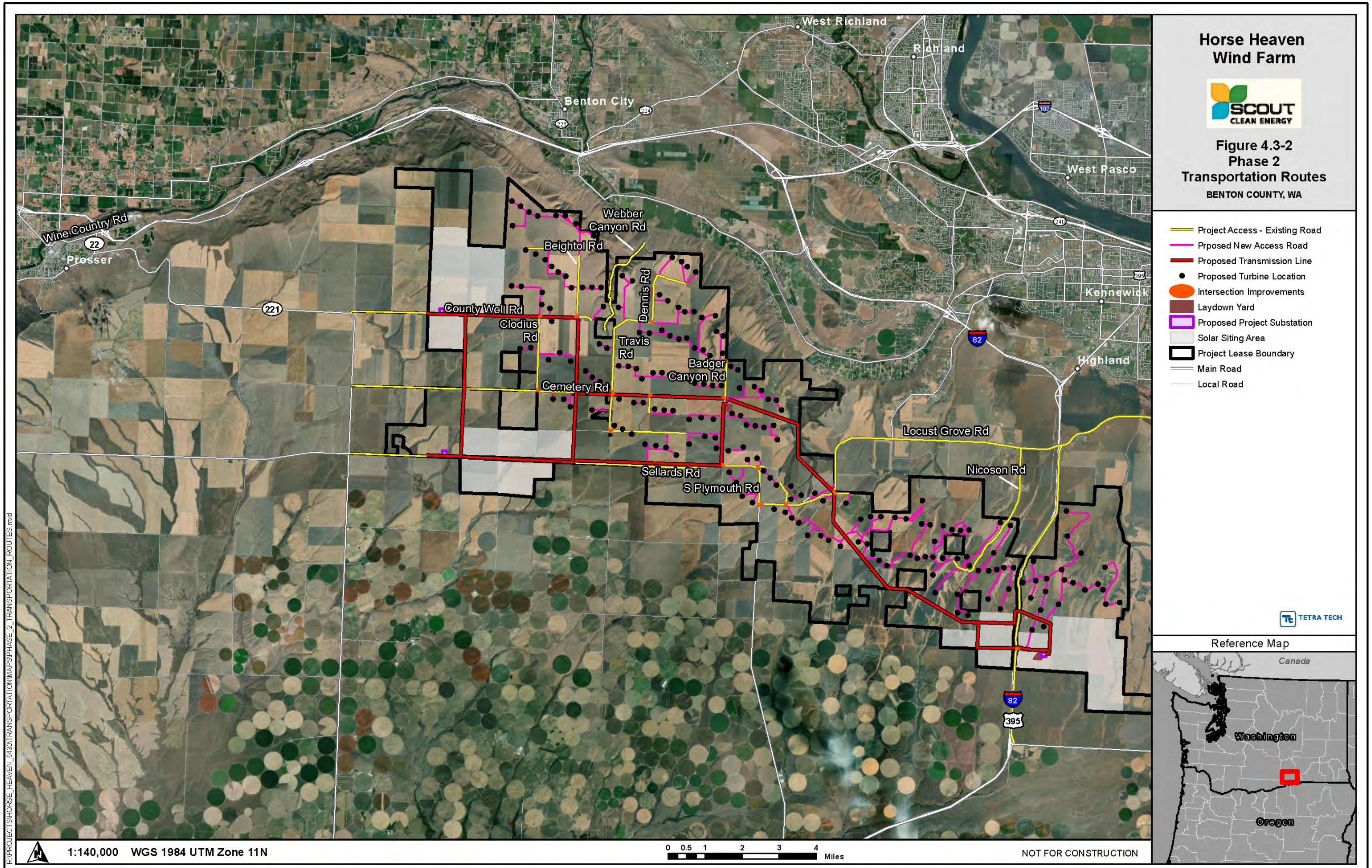
- Phase 2b could increase power generation via the construction of additional wind turbines, but construction would not include a BESS.

Possible transportation routes for the Project during construction are shown in **Figure 3.14-2 for Phase 1 and Figure 3.14-3 for Phase 2**.



Source: Horse Heaven Wind Farm, LLC 2021

Figure 3.14-2: Transportation Routes for Phase 1



Source: Horse Heaven Wind Farm, LLC 2021

Figure 3.14-3: Transportation Routes for Phase 2

The Project vicinity is utilized for agricultural activities. Most of the roads that would be utilized by the Project primarily serve local rural residents and the transport of agricultural produce. The agriculture and food manufacturing sector is a cornerstone of Washington's economy in both rural communities and metropolitan areas. The top four agricultural supply chains in Washington are apples, dairy, wheat, and potatoes, with all supply chains relying on corridors within the study area (WSDOT 2017).

3.14.1.1 Local Infrastructure

The Washington State Department of Transportation (WSDOT) is charged with planning, funding, implementing, constructing, and maintaining the multimodal transportation system in the state. WSDOT is responsible for managing and directing the state's freight and passenger rail capital and operating programs.

WSDOT establishes level of service (LOS) standards for state highways and ferry routes of statewide significance based on Revised Code of Washington (RCW) 47.06.140(2). LOS is a qualitative measure that predicts the quality of experience by motorists using the infrastructure. An LOS analysis evaluates the potential change to the LOS rating of roadways and intersections anticipated to be impacted by Project development. The LOS analysis provides a standardized means of categorizing efficiency and experiential quality by assigning a letter grade to it. LOS ratings range from A to F, with A representing the best conditions and F representing unacceptably high congestion and delays, as shown in **Table 3.14-1**. Regional transportation planning organizations and WSDOT jointly develop and establish LOS standards for regionally significant state highways and ferry routes based on RCW 47.80.030(1)(c).

Table 3.14-1: Definition of Level of Service Ratings for Roadways

LOS	Description[a]	Signalized Intersection	Unsignalized Intersection	Highway/ Freeway	Volume-to-Capacity Ratio
		Delay (s/veh)		Density (pcpmpl)	
A	Free-flow	0–10	0–10	0–11	0.00–0.60
B	Reasonably free-flow	10–20	10–15	11–18	0.61–0.70
C	Stable flow	20–35	15–25	18–26	0.71–0.80
D	Approaching unstable flow	35–55	25–35	26–35	0.81–0.90
E	Unstable flow	55–80	35–50	35–45	0.91–1.00
F	Forced or breakdown flow	> 80	> 50	> 45	> 1.00

Source: Horse Heaven Wind Farm, LLC 2021
Notes:
(a) Descriptions provided by the summary of data in WSDOT (2021c)
> = greater than; LOS = Level of Service; pcpmpl = passenger cars per mile per lane; s/veh = seconds per vehicle

Procedures based on the Transportation Research Board Highway Capacity Manual guidelines were used to complete an LOS analysis for roads impacted by Project development (TRB 2016). The LOS performance measure of an intersection is based on the delay that an average vehicle will experience after approaching the intersection. Unsignalized intersections include two-way and all-way stop-controlled intersections and roundabouts. Signalized intersections are those that have traffic signals/traffic lights. The LOS for highways and freeways is based on the density of the road in passenger cars per mile per lane. Roadways that are not highways/freeways are only analyzed at their intersections, as the intersections on those roads are the conflicting zones where delay occurs. Grade-separated interchanges are analyzed as two independent unsignalized/ signalized intersections where the two exit ramps meet the cross street.

The State of Washington's Growth Management Act (RCW 36.70A.070) requires that cities and counties include a transportation element in their comprehensive plans. The transportation element of the Benton County Comprehensive Plan describes the existing transportation network, LOS, planned improvements and financing, and intergovernmental coordination needs, as required under RCW 36.70A.070(6), which helps integrate the transportation planning with land use (Benton County 2021a).

After adoption of the comprehensive plan, local jurisdictions must adopt and enforce ordinances that prohibit development approval if the development causes the LOS on a locally owned transportation facility to decline below the standards adopted in the transportation element of the comprehensive plan, unless transportation improvements or strategies to accommodate the impacts of development are made concurrently with the development. These strategies may include increased public transportation service, ride-sharing programs, demand management, and other transportation systems management strategies.

Benton County participates in the Benton-Franklin Regional Transportation Planning Organization and the Tri-Cities Metropolitan Planning Organization. RCW 36.81.121 requires the development of a perpetual, advanced, six-year transportation improvement program (TIP) for coordinated transportation that describes the road maintenance and improvement program. The 2022–2027 six-year TIP was approved on August 10, 2021 (Benton County 2021b). Transportation and roadway projects are identified to meet stated performance measures addressing safety, pavement, and bridges, as well as system performance, freight, and congestion mitigation. The planning area covered by these efforts includes the entirety of Benton County, including the study area for the Project.

Traffic data are only available for roadways in the area, and no new traffic counts were collected as part of the ASC for the Project. To analyze intersections, assumptions were made regarding turning movement counts based on the number of vehicles on the intersecting roads. Intersections that would be heavily utilized for Project construction and have appreciable background traffic volumes were analyzed for impacts.

The analysis did not include all intersections since not all intersections are utilized during the peak hour, the time required for the analysis. All calculations on outputs are based on the Highway Capacity Software (HCS7) package (Horse Heaven Wind Farm, LLC 2021).

All utilized roads and available traffic count data and jurisdictions are summarized in **Table 3.14-2**. The table also summarizes the physical characteristics and conditions for the local infrastructure. The conditional assessment is a qualitative judgment utilizing 2018 aerial imagery and does not represent a detailed characterization of quality based on in-person inspections of pavement or quantitative metrics such as asphalt/gravel depth, age, or design life.

Table 3.14-2: Utilized Highway and County Roads and Future Forecasted Traffic Volumes

Access Road	Jurisdiction	Width (feet)[a]	LOS Standard[b]/ Speed Limit	Number of Lanes[c]	Peak Hour Average Traffic[d]	Current ADT[e]	Future ADT (10-Year Forecast)[f]	2021 FGTS Class[g]	Condition/Notes[h]
I-82	FHWA/WSDOT	36/side	C/70 mph	4	2,100	21,000 AADT (2019)	No data	T-1	Fair; minor cracking especially on the shoulders; road may have been resurfaced because most cracking does not continue into road.
Coffin Road	Benton County	30	No data	2	32	318	427	No data	Fair; some minor cracking visible.
Bofer Canyon Road	Benton County	32	No data	2	No data	No data	No data	No data	Good; no cracking or wear visible, appears to have been redone between 2013 and 2015.
Nine Canyon Road	Benton County	28	No data	2	63	630	847	T-4	Good; appears to have been paved between 2013 and 2015.
Beck Road	Benton County	20	No data	1.5	No data	No data	No data	T-5	Poor; evidence of rutting all along gravel road.
Kirk Road	Benton County	18	No data	1.5	No data	No data	No data	No data	Good; rutting was repaired in 2016, gravel surface appears smooth.
State Route 397	WSDOT	36	D/60 mph	2	190	1,900	No data	T-3	Poor; plentiful filled cracks along the entire road.
S. Finley Road	Benton County	24	No data	2	348	3,484	4,682	T-4	Good; appears to be repaved between 2015 and 2016.
State Route 221	WSDOT	32	C/65 mph	2	250	2,500	No data	T-2	Good; no visible wear or cracking.
Webber Canyon Road	Benton County	32	C/25 mph	2	76	759	1,020	T-3	Good; provides connectivity to Benton City and appears well maintained.
Travis Road	Benton County	28	C/50 mph	2	60	595	800	T-3	Good; a continuation of Webber Canyon Road.
Locust Grove Road	Benton County	32	No data	2	36	362	486	T-3	Good; no obvious signs of wear and condition appears unchanged through the available imagery.
Nicoson Road	Benton County	20	No data	2	No data	No data	No data	No data	The first 4,600 feet is good condition paved, then it transitions to gravel/two-track road that is very narrow and may be a private road.
S. Plymouth Road	Benton County	32	C/50 mph	2	67	659	886	T-3	Good; some very occasional minor cracking/wear.
Sellards Road	Benton County	32	C/50 mph	2	71	713	958	T-3	Good; is a continuation of S. Plymouth Road.
Badger Canyon Road	Benton County	18	No data	1.5	35	345	464	No data	Good; no visible rutting or washout.
Cemetery Road	Benton County	18	No data	1.5	No data	No data	No data	No data	Fair; some evidence of worn tracks, though no apparent ruts.
Clodius Road	Benton County	16	No data	1.5	No data	No data	No data	No data	Fair; narrow and worn looking, but no obvious ruts.
County Well Road	Benton County	20	No data	2	21	209	281	T-3	Good; probably very light use with no visible change in conditions throughout available imagery.
Beightol Road	Benton County	16	No data	1.5	No data	No data	No data	No data	Fair; narrow and worn looking.
Dennis Road	Benton County	16	No data	1.5	No data	No data	No data	No data	Fair; some washboarding visible.

Source: Unless otherwise noted, Horse Heaven Wind Farm, LLC 2021 Tables 4.3-1 and 4.3-2

Notes:

(a) Width measured from aerial imagery is approximate edge of shoulder to edge of shoulder. For paved road only; the paved shoulder is included though most have additional gravel.

(b) LOS for state routes (including I-82, SR-307, and SR-221) is the existing standard set by WSDOT. This is the lowest acceptable rating for that road.

(c) The number of lanes is the total number of lanes counting both directions: 1.5 lanes indicates a road that is gravel as gravel roads do not have lane markings and usually have less width than a typical 2-lane paved road.

(d) Peak Hour Average Traffic is calculated as 10% of ADT per HCM guidelines; TRB 2016

(e) Current ADT data for Benton County roads is from 2015–2016; only county roads with LOS and ADT data are included. Current AADT data for I-82 are from the closest permanent traffic recorder (P-09).

(f) Future ADT for Benton County roads is forecast to either 2025 or 2026, depending on current ADT year and 10-year forecast uses a 3% yearly increase in ADT.

(g) WSDOT 2021a

(h) The conditional assessment is a qualitative judgment utilizing 2018 aerial imagery and does not represent a detailed characterization of quality based on in-person inspections of pavement or quantitative metrics such as asphalt/gravel depth, age, or design life Information will be verified by a third-party engineer during the required traffic analysis described in Section 4.14.2.4.

AADT = average annual daily traffic; ADT = average daily traffic; FGTS = Freight and Goods Transportation System; FHWA = Federal Highway Administration; HCM = Highway Capacity Manual; I-82 = Interstate 82; LOS = level of service; mph = miles per hour; SR = State Route; WSDOT = Washington State Department of Transportation

The LOS presented in **Table 3.14-3** is the prediction of the current functional quality of the local major intersections during the peak hour. Based on the available data for average daily traffic, shown in **Table 3.14-2**, the annual growth rate used in the forecast was approximately 3 percent for all roads (Horse Heaven Wind Farm, LLC 2021). Horse Heaven Wind Farm, LLC (Applicant) made assumptions for roads for which traffic data are not available based on engineer's experience, road connectivity, road size, road condition, and the number of homes or other destinations along the road. According to the ASC, existing traffic conditions are considered good. The intersections are below their capacities, and traffic flows freely throughout the Project vicinity.

Table 3.14-3: Existing Conditions Level of Service

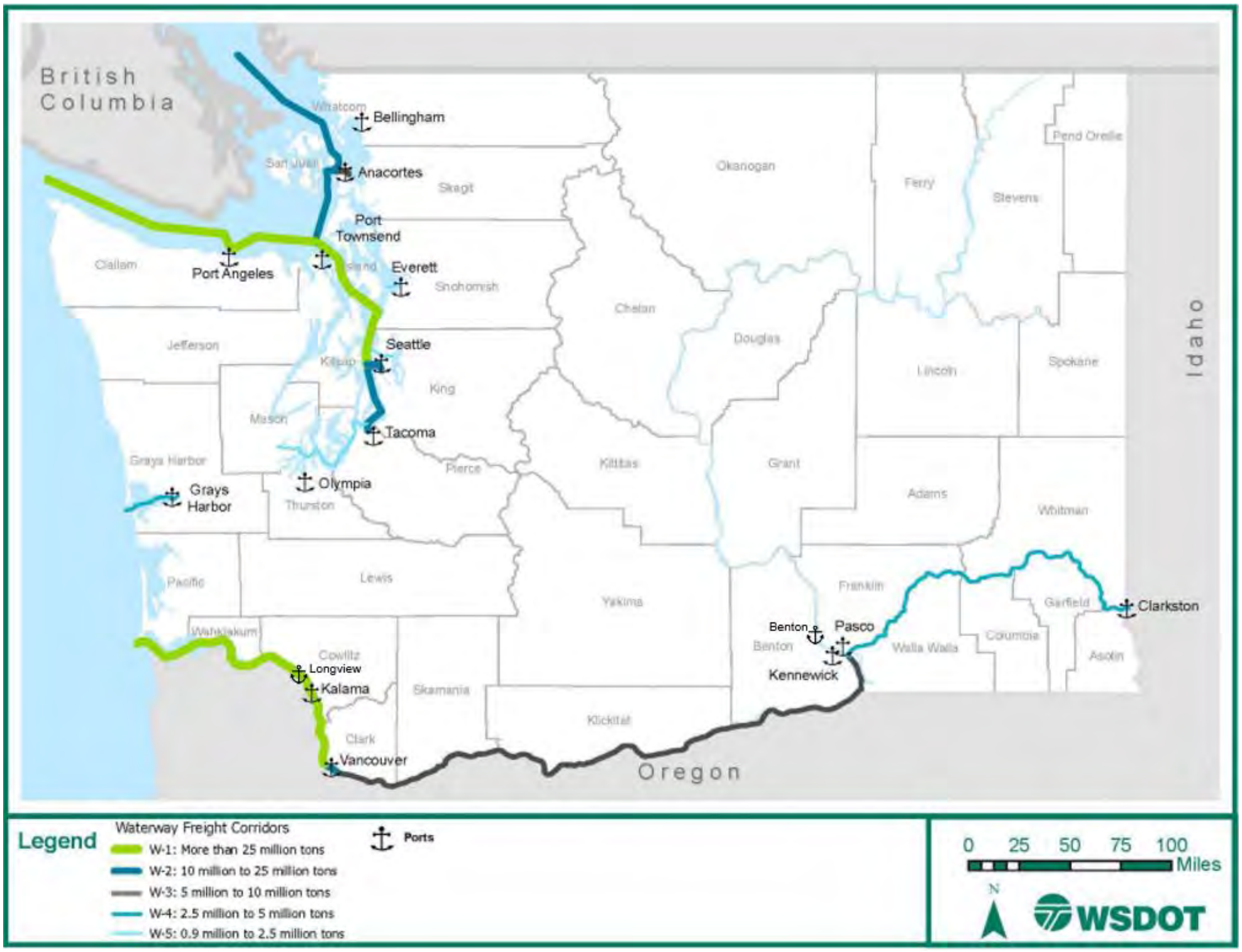
Highway/Freeway	Density (pcpmpl)	LOS
I-82	10.9	A
State Route 397	0.4	A
State Route 221	0.5	A
Intersection	**Delay (seconds)**	**LOS**
Route 397 and S. Nine Canyon Road	11.4	B
Bofer Canyon Road and Beck Road	8.8	A
I-82 N Ramp and Locust Grove Road	10.1	B
I-82 S Ramp and Locust Grove Road	11.5	B
Locust Grove Road and S Plymouth Road	8.8	A
Travis Road and Cemetery Road	9.3	A
Route 221 and Sellards Road	12.9	B

Sources: WSDOT 2019, 2020; Horse Heaven Wind Farm, LLC 2021
Notes:
(a) LOS grades for highways/freeways and intersections are defined in **Table 3.14-2**.
I-82 = Interstate 82; LOS = level of service; pcpmpl = passenger cars per mile per lane

3.14.1.2 Waterborne, Rail, and Air Traffic

Waterborne Traffic

A total of 812 miles of waterways are identified as FGTS corridors. Of those, 751 miles were classified as W-1 (more than 25 million tons) through W-4 (2.5 million to 5 million tons) corridors and designated by the Washington State Freight Mobility Strategic Investment Board as part of the Strategic Freight Corridors. Waterways and ports are shown in **Figure 3.14-4**. Washington has the largest locally controlled port system in the world (Washington Ports n.d.). Public ports in Washington were authorized under the Port District Act of 1911. Each of Washington's 75 ports was formed by a vote of the residents and governed by publicly elected, local officials. Washington Port districts are unique, special-purpose districts with the primary mission of promoting economic development. Ports can build and operate commercial and general aviation airports, marine terminals, marinas, railroads, and industrial parks.



Source: WSDOT 2021a, with edits showing Port of Longview and Port of Benton

Figure 3.14-4: Waterway Freight Corridors

The Port of Benton, Port of Kennewick, and Port of Pasco on the Columbia River serve the area by water.

- The Port of Benton, established in 1958, was created following the transfer of ownership of Richland from the U.S. Army Corps of Engineers to the citizens in 1959. Previously, Richland had been the property of the federal government as part of a World War II secret mission called the Manhattan Project. The Port of Benton was designated as a Nuclear Port in 1965 by the U.S. Coast Guard and is one of only a handful of ports in the nation authorized to handle radioactive materials (Port of Benton n.d.).
- The Port of Kennewick provides mixed-use amenities and operates the Clover Island Marina for the launching and/or moorage of boats in Kennewick's Historic Waterfront District (Port of Kennewick 2019).
- The Port of Pasco is considered the largest public marine terminal on the upper Columbia River. The Port of Pasco was originally formed to provide facilities for barge shipments of grain from the area on the Columbia River to the seacoast terminals. The Port of Pasco has a 600-acre industrial center with several miles of railroad tracks and streets and over 1.7 million square feet of buildings. The Port of Pasco also took over the

former World War II U.S. Navy facility, known as the Pasco Airport, and renamed it the Tri-Cities Airport (Port of Pasco 2022).

The Port of Longview, Port of Kalama, and Port of Vancouver are the closest seaports to the Lease Boundary.

- The Port of Longview offers bulk cargo handling and has eight marine terminals and waterfront industrial property spanning 835 acres on the Columbia River, 66 miles from the Pacific Ocean in southwest Washington State (Port of Longview n.d.). Cargo handling at the Port of Longview includes all types of bulk cargo and breakbulk commodities such as fertilizers, grain, heavy-lift cargo, logs, lumber, minerals, paper, pulp, steel, and wind energy components (Port of Longview n.d.).
- The Port of Kalama sits on the Columbia River immediately west of Interstate 5. The Port of Kalama is a marine terminal port that offers 5 miles of riverfront industrial acreage and is served by the Burlington Northern/Santa Fe and Union Pacific railroads (Port of Kalama 2022).
- The Port of Vancouver connects Asia and South America to the U.S. midcontinent and Canada and handles more than 7 million tons of cargo each year, including wheat, mineral and liquid bulks, vehicles, and other project cargo (Port of Vancouver USA 2022).

Rail Traffic

Rail is an integral part of Washington's statewide transportation system. Railroads carry a variety of products, including agricultural products, energy products, forest products, chemicals, containerized goods, finished automobiles, and waste products (WSDOT 2020).

Several freight stations are within the Project's study area, including (USDOT n.d.):

- Hedges (Freight Station Accounting Code [FSAC] 07427)
- Kennewick (FSAC 07430 and FSAC 13004)
- Hover (FSAC 12147)
- Finley (FSAC 12151)
- Cushman (FSAC 12153)
- Yellepit (FSAC 12159)
- Plymouth (FSAC 12183)
- Vista (FSAC 13007)
- Badger (FSAC 13017)
- Kiona (FSAC 13024)
- Gibbon (FSAC 13034)
- Prosser (FSAC 13040)
- Whitstran (FSAC 5003)

Source: WSDOT 2021a
Figure 3.14-5: Rail Freight Corridors in Washington State

Planning and investment in the state's rail system is guided by WSDOT's vision for a safe, sustainable, and integrated multimodal transportation system. The State Rail Plan is consistent with the Transportation System Policy Goals adopted by the state legislature and with statewide and metropolitan planning. Burlington Northern-Santa Fe, Union Pacific Railroad, and Tri City and Olympia Railroad Company provide commercial rail service to the area. Amtrak provides passenger rail service to the area. Freight and passenger services share much of the same infrastructure and operate as an integrated rail system (WSDOT 2020). WSDOT sponsors Amtrak Cascades intercity passenger rail service in conjunction with the Oregon Department of Transportation.

The LOS grades and descriptions for rail correspond generally to the LOS grades used in the Federal Highway Administration's Highway Performance Monitoring System. The capacity analysis results are expressed as LOS grades by comparing combined freight and passenger train volume to the practical capacities of each segment. The volume/capacity ratios and the corresponding LOS grades are listed in **Table 3.14-4**.

Table 3.14-4: Definition of Level of Service Grades for Rail

LOS Grade	WSDOT Definition	Volume/Capacity Ratio
A	Below Capacity - Low to moderate train flows with capacity to accommodate maintenance and recover from incidents	0.0 to 0.2
B	Below Capacity - Low to moderate train flows with capacity to accommodate maintenance and recover from incidents	0.2 to 0.4
C	Below Capacity - Low to moderate train flows with capacity to accommodate maintenance and recover from incidents	0.4 to 0.7
D	Near Capacity - Heavy train flow with moderate capacity to accommodate maintenance and recover from incidents	0.7 to 0.8
E	At Capacity - Very heavy train flow with limited capacity to accommodate maintenance and recover from incidents	0.8 to 1.0
F	Above Capacity - Unstable flows; service breakdown conditions	>1.00

Source: WSDOT 2020
LOS = level of service; WSDOT = Washington State Department of Transportation

Three future scenarios were evaluated by WSDOT for system capacity analysis in 2019:

- Low growth scenario: combines the low growth scenario established for freight rail volume forecast, and for Cascades rail ridership forecast
- Moderate growth scenario: combines the corresponding moderate scenarios established for freight rail volume forecast and for Cascades passenger rail ridership forecast
- High growth scenario: combines the corresponding high growth scenarios established for freight rail volume forecast and for Cascades passenger rail ridership forecast

These three scenarios included existing long-distance and commuter services for capacity analysis but did not account for additional Amtrak long-distance trains or Sounder commuter rail trains.

The results of the LOS analysis are summarized in **Table 3.14-5**.

Table 3.14-5: Rail Level of Service Estimation for Base and Forecast Year Scenarios

Name of Corridor	2019 State Rail Plan Update LOS[a]			
	2016 Base Year	2040 Low Growth	2040 Moderate Growth	2040 High Growth
Auburn-Pasco	B	A	B	B
Everett-Vancouver, B.C., Canada	C	C	E	F
Hinkle, OR-Lakeside	C	B	E	F
Pasco-Lakeside	C	C	E	F
Vancouver-Pasco	E	D	F	F
Seattle-Tacoma (BNSF)	C	C	D	E
Seattle-Tacoma (UP)	A	A	B	B
Tacoma-Vancouver (BNSF/UP Shared Use Segment)	C	C	E	F
Seattle-Everett	C	C	E	F
Everett-Spokane	C	C	F	F
Lakeside-Spokane (BNSF/UP Shared Use Segment)	E	D	F	F
Spokane-Sandpoint, ID (BNSF)	C	C	F	F
Spokane-Sandpoint, ID (UP)	C	B	E	F
Portland, OR-Vancouver (BNSF/UP Shared Use Segment)	B	C	C	E
Fallbridge-Chemult, OR	A	A	A	A

Source: WSDOT 2020
Notes:
[a] LOS grades for rail are defined in **Table 3.14-4**.
B.C. = British Columbia; BNSF = Burlington Northern-Santa Fe; ID = Idaho; LOS = level of service; OR = Oregon; UP = Union Pacific

This analysis provides an indication of current and future demands for capacity and resulting congestion, absent any operational change and investments to increase capacity. The capacity analysis results identified multiple segments where capacity would be insufficient to handle Project-related traffic without changes.

Air Traffic

The Tri-Cities Airport and the smaller airports, Port of Benton Airport and Richland Airport, serve the area surrounding the Lease Boundary. The Tri-Cities Airport, which is associated with the Port of Pasco, is the largest airport in the southeastern Washington/northeastern Oregon region, with connections to 11 major hubs (Port of Pasco 2022). Both the Port of Benton Airport and the Richland Airport were acquired by the Port of Benton in 1961. The Port of Benton Airport, formerly the Prosser Airport or the George O. Beardsley Field, was transferred by the City of Prosser to the Port of Benton, and the federal government transferred the Richland Airport, formerly the Atomic Energy Field, to the Port of Benton (Port of Benton n.d.).

3.14.1.3 Parking

The Project Lease Boundary is located in rural agricultural land with no major existing public parking facilities. Parking along roads within the Lease Boundary occurs for two recreational opportunities—the Horse Heaven Hill Cemetery and Johnson Butte.

3.14.1.4 Movement/Circulation of People or Goods

State and interstate highways are designed and constructed to handle legal loads of 105,500 pounds (gross weight). Some trucks that deliver large and heavy equipment (typically the base, lower middle, and top tower sections, nacelles, drive train, and hub) would be required to obtain oversize/overweight permits. These permits allow travel on all unrestricted roads. I-82 and State Route 397 are constructed to standards that will safely allow legally oversized/overweight trucks to pass with no adverse impact on the road surface. None of the state roads currently have size or weight restrictions. The condition of the existing Benton County roads that would be used by the Project varies from improved gravel two-lane roads to two-track roads with minimal aggregate surfacing.

3.14.1.5 Traffic Hazards

Existing traffic hazards consist of current truck transport (including hazardous materials, such as fuel), agricultural equipment, and vehicle accidents. Approximately 66 collisions occurred from January 1, 2020, through January 31, 2021, that resulted in an injury in the study area, including several that occurred within the Lease Boundary (County of Benton n.d.). Three fatalities were reported in the study area in 2021 (County of Benton n.d.). Work zone traffic control, or maintenance of traffic, can be used to decrease fatalities related to the transportation of oversized materials for the construction of projects.

The primary function of work zone traffic control is to allow all modes of traffic, including motor vehicles, bicyclists, and pedestrians, to move safely and easily through or around work areas while still allowing safe and efficient work operations to be conducted. Effective temporary traffic control enhances traffic safety and efficiency. The Federal Highway Administration's Manual on Uniform Traffic Control Devices is adopted by WSDOT as the legal standard. Traffic Control Plans are used for projects to communicate work duration, personal protective wear requirements, traffic control devices and equipment, required flagging, and other special considerations, including other roadway users or traffic concerns such as school zones and/or rail crossings.

Speed zones (limits) are established based on the concept of reasonable speed. Roads with no posted speed are subject to the Basic Speed Rule. Under Washington State law, the maximum speed limit in urban areas is 50 miles per hour (mph). All other speed limits are called "prima facie limits," which are considered by law to be safe and prudent under normal conditions. Certain prima facie limits are established by state law and include 25 mph in business and residential districts and 20 mph in school zones.

The following schools and school zones are located in the study area:

- Cottonwood Elementary near East Badger Road
- Prosser Heights Elementary near State Route 22
- Housel Middle School near State Route 22
- Prosser High School near State Route 22
- Keene Riverview Elementary near State Route 22

School zones are areas near marked crosswalks installed adjacent to school grounds. Washington State Law RCW 46.61.440, in regard to driving speed in a designated school zone, specifies "Speed 20 miles per hour when children are present." This reduced speed is in effect 24 hours per day, not just during crossing hours. In some cases, the school crossing area may have speed beacons (flashers). At these crossings, the 20 mph school zone is in effect any time these beacons are flashing (Kennewick Washington n.d.).

Rail Safety

The Washington Utilities and Transportation Commission (UTC) is the state agency responsible for regulating railroad safety in Washington. The UTC's Rail Safety program protects the public and railroad employees by ensuring that railroad companies meet established state and federal safety standards and by educating the public about the dangers of traveling on or near railroad tracks.

The UTC inspects railroad crossings in the state every three years and railroad crossings located on crude oil routes every 18 months, monitors railroad grade crossing inventory information, and documents trespassing and incident data.

The UTC, through Title 49, Code of Federal Regulations Part 212, is the designated state agency that partners with the Federal Railroad Administration (FRA) to inspect rail shipments of hazardous materials. There are more than 300 inspection points throughout the state, including shippers' facilities, railroad yards, and terminals. In addition to these hazardous materials inspections, the UTC's FRA-certified inspectors perform inspections on signal and train control equipment, track, motive power and equipment, railroad operating practices, and grade crossings.

In addition, the UTC has regulatory authority over safety at public highway-rail grade crossings. The UTC monitors all accidents and incidents at public and private crossings, including investigating fatalities and injuries. Private crossings are those that cross the tracks into residential driveways or service roads, or on industrial properties and along railroad rights-of-way.

The UTC funds projects to improve public safety at crossings and to limit pedestrian access to railroad rights-of-way through the Grade Crossing Protection Fund. The UTC also partners with Operation Lifesaver, Inc., and coordinates activities with Washington Operation Lifesaver, a public service education program dedicated to preventing collisions, injuries, and fatalities on and around railroad tracks and highway-rail grade crossings.

The UTC recorded 33 accidents and incidents at Washington State grade crossings in 2021. One of these occurred in Benton County (UTC 2022).

Crossings that are in the vicinity of the Project and could intersect the assumed transport routes of materials for the Project include:

- Crossing 927487A, where train tracks cross over Webber Canyon Road
- Crossing 928191E, where train tracks cross under I-82 near West Clearwater Avenue
- Crossing 928192L. where train tracks cross Dallas Road at grade
- Crossing 966466M, where train tracks cross under eastbound I-82 near the Lewis and Clark Trail Highway
- Crossing 966467U, where train tracks cross under westbound I-82 near the Lewis and Clark Trail Highway

All crossings except Crossing 928192L are located above (overpass) or under (underpass) the transport route. Crossing 928192L, where train tracks cross Dallas Road is a grade crossing, meaning that the crossing occurs at the same grade as other traffic. Two BNSF trains use this crossing each 24-hour period, at a maximum speed of 40 miles per hour. UTC has recorded two accidents at this crossing, one occurring in 1992 and the other in 2008. In both cases, the vehicle driver did not heed the warning signals at the crossing. Neither accident resulted in an injury or fatality. The crossing is equipped with automatic crossing signals and gates, which means when a train is approaching, the gates go down to block access to the track until the train passes through. To circumvent the gates, a driver must be fully aware of the downed gates and consciously choose to drive around the gates and over the tracks.

This Page Intentionally Left Blank

3.15 Public Services and Utilities

This section describes the public utilities and the regulatory setting in the proposed Horse Heaven Wind Farm (Project, or Proposed Action) and Project vicinity. Public services such as law enforcement, fire protection, emergency management services, and hospitals are discussed in Section 3.13, Public Health and Safety. Similarly, schools are discussed as part of Section 3.16, Socioeconomics. The Project vicinity includes the areas 4 miles south/southwest of the City of Kennewick, Washington, and the larger Tri-Cities urban area along the Columbia River. A public utility is an organization that maintains the infrastructure for a public service. A reduction in the reliability of a public utility service affects all areas of daily life. Section 4.15 discusses the Project's anticipated impact on the availability of public services and utilities within the Project vicinity and Benton County.

Utilities, as described in the Benton County Comprehensive Plan, include the following:

- Supply, treatment, and distribution of domestic and irrigation water
- Collection and treatment of sewage
- Collection and conveyance of stormwater
- Supply and distribution of natural gas
- Supply and distribution of electricity
- Telecommunications, including broadband internet services, cable television (TV), and microwave transmissions
- Collection and disposal of solid waste
- Construction, operation, and maintenance of streets (Benton County 2021)

Sections 3.4 and 4.4, Water Resources, analyze the collection and conveyance of stormwater within the Lease Boundary and Project vicinity. Sections 3.7 and 4.7, Energy and Natural Resources, evaluate the supply and demand for electricity and water within the Project vicinity, Benton County, and the State of Washington. Sections 3.14 and 4.14, Transportation, evaluate the Project's impact on streets.

Regulatory Setting

Washington Administrative Code (WAC) 463-60-535(4) requires a review of a proposed facility's impact on utilities. The primary regulatory agency for most utilities in the State of Washington is the Washington Utilities and Transportation Commission (UTC). The UTC ensures that safe and reliable service is provided to customers at reasonable rates. The State of Washington's Growth Management Act (Revised Code of Washington [RCW] 36.70A.070) requires that cities and counties include a utilities element in their comprehensive plans that describes the general location, proposed location, and capacity of all existing and proposed utilities, including, but not limited to, electrical lines, telecommunication lines, and natural gas lines. The relevant goals and policies of the Benton County Comprehensive Plan's utilities element (UE) include the following:

- UE Goal 1: Ensure utilities support the land use and economic development goals of the County.
- UE Goal 2: Maintain public and private household water and sewer systems that are consistent with the rural character of the County.

- UE Goal 3: Facilitate efficiency in utility land use and development.
  - Policy 2: Encourage multiple uses, including passive recreational use, in utility corridors where practical.
  - Policy 3: Facilitate maintenance and rehabilitation of existing utility systems and facilities and encourage the use of existing transmission/distribution corridors (Benton County 2021).

3.15.1 Affected Environment

Benton County is predominantly rural and agricultural in nature, with unincorporated areas making up most of the county's territory. Benton County consists of several unincorporated communities, as well as the incorporated cities of Benton City, Kennewick, Prosser, Richland, and West Richland. The county is bordered on the west by Klickitat and Yakima Counties, on the north by Grant County, on the east by Franklin and Walla Walla Counties, and on the south by Umatilla County, Oregon. The county is located at the confluence of three rivers: the Columbia, Yakima, and Snake Rivers. The Yakima River runs through the middle of the county, to its confluence with the Columbia River in Richland.

Domestic and Irrigation Water

All water systems within the State of Washington are regulated by the Washington State Department of Health, Office of Drinking Water. While more than 85 percent of the state's population gets their drinking water from public water systems, 15 percent obtain their water from domestic supplies.

A domestic use is a water supply used for domestic purposes, as defined by WAC 173-518-030. Typically, a domestic water supply comes from a well that is exempt from permitting under RCW 90.44.050 and the Washington State Department of Health's public water system requirements. The use and development of a surface water or spring for a domestic water supply typically require water right permitting from the Washington State Department of Ecology.

Irrigation districts in the State of Washington are created under RCW 87.03. The irrigation districts of Roza, Sunnyside Valley, Benton, Kennewick, Kiona, Columbia, and Badger Mountain serve Benton County (Benton County 2021). The City of Kennewick's Municipal Water System obtains water from the Kennewick and Columbia Irrigation Districts (City of Kennewick 2017). The Lease Boundary is not located within any of the seven irrigation districts; however, the Kennewick Irrigation District is located just north of the Lease Boundary.

Wastewater

The State of Washington, in accordance with WAC 246-272A, requires that all wastewater receive treatment to protect human health and aquatic life. Although the State of Washington has more than 600 wastewater treatment plants, most rural residents in Benton County rely on on-site septic tanks and drain fields for their wastewater system needs. The Benton-Franklin Health District is responsible for permitting, overseeing the design and installation of, and inspecting small on-site septic systems with wastewater flows of less than 3,500 gallons per day (Benton-Franklin Health District 2021). For large on-site sewage systems with design flows above 3,500 gallons per day, WAC 246-272B requires the operator to obtain approval from the Washington State Department of Health.

Water and Stormwater

Except for the Cities of Kennewick and Richland, the source of the water supply for Benton County and its municipalities is groundwater. In addition to withdrawing groundwater as their primary source of water, the Cities of Kennewick and Richland withdraw water from the Columbia River to assist in meeting their communities' demands. There are no public water supply wells located within the Lease Boundary. Sections 3.4 and 4.4, Water Resources, evaluate groundwater and stormwater resources within the Lease Boundary and Project vicinity.

Sections 3.7 and 4.7, Energy and Natural Resources, evaluate the supply and demand for water. As discussed in Section 3.7, the Application for Site Certification indicates that the Project would be supplied with water through a haul agreement with a private vendor (Horse Heaven Wind Farm, LLC 2021). The Applicant's water source documentation states that the vendor would likely acquire the water from the Kennewick Utility Services Division of Public Works. This division is responsible for the city's water treatment plant, wastewater treatment plant, wastewater collection, and water distribution programs.

Natural Gas

Cascade Natural Gas Corporation builds, operates, and maintains natural gas facilities serving Benton County. Cascade Natural Gas is an investor-owned utility serving customers in 16 counties in Washington State. The Pacific Northwest receives its natural gas from the southwest United States and Canada. Natural gas is supplied to the entire region via two interstate pipeline systems. The Northwest Pipeline Corporation owns and operates the network that supplies natural gas to Benton County. Natural gas is stored in a facility in Plymouth. A network of small-diameter distribution mains and service lines transports the gas to end-users (Benton County 2021). Sections 3.7 and 4.7, Energy and Natural Resources, evaluate the supply and demand for energy.

Electricity

The Bonneville Power Administration (BPA) is an agency of the U.S. Department of Energy. It wholesales electric power produced at 29 federal dams located in the Columbia-Snake River Basin, and one non-federal nuclear plant. Electricity is purchased from the BPA and supplied to areas in Benton County by either the Benton County Public Utility District (Benton PUD) or the Benton Rural Electric Association (Benton REA). The Lease Boundary includes areas that fall under the management of the Benton PUD and Benton REA. The service areas of each provider are as follows:

- **Benton PUD**: The Benton PUD's service area is entirely within Benton County and includes the cities of Kennewick, Benton City, Prosser, and portions of West Richland. The Benton PUD serves Benton County except for the City of Richland, the U.S. Department of Energy's operations on the Hanford Reservation, and rural areas of the county that are served by the Benton REA (Benton County 2021).
- **Benton REA**: The Benton REA is a consumer-owned rural cooperative that serves portions of Benton, Lewis, and Yakima Counties. The Benton REA's 1,300-square-mile territory extends from the Columbia River at Paterson, north to the Hanford Reservation, and west to White Pass in the Cascade Mountains. The Benton REA serves the rural areas of Benton County and some urban areas (Benton County 2021).

Sections 3.7 and 4.7, Energy and Natural Resources evaluate the supply and demand for electricity within the Lease Boundary and Benton County.

Telecommunications and Cable Television

Several companies supply local, long-distance, and cellular telecommunications services in Benton County (Benton County 2021). Spectrum is the primary cable internet service provider in Benton County and is available to approximately 91 percent of its residents. In addition to Spectrum, several additional TV and internet service providers provide cable TV and internet access to the county's homes and businesses.

Solid Waste

Solid waste landfills in the State of Washington are regulated by local health departments and the Department of Ecology through the Criteria for Municipal Solid Waste Landfills Chapter 173-351 WAC. Within Benton County, the UTC, Benton County, and municipalities regulate solid waste collection. The Benton County solid waste program is managed by the Benton County Road Department and run in accordance with the Benton County Solid Waste Plan and Moderate Risk Waste Plan 2013 Update and with the advice of the Benton County Solid Waste Advisory Committee. Representatives from each of the cities in Benton County, the Washington State Department of Ecology, the Benton-Franklin Health District, and local refuse and recycling companies make up the Benton County Solid Waste Advisory Committee.

The generation of solid waste within Benton County and the cities of Benton City, Kennewick, Prosser, Richland, and West Richland is managed in alignment with the Benton County Solid Waste and Moderate Risk Waste Plan 2013 Update (Benton County 2014). The plan is intended to provide citizens and decision makers in Benton County with a guide to implement, monitor, and evaluate future activities related to solid waste for a 20-year period. As shown in **Table 3.15-1**, the county and its incorporated municipalities generated 263,603 tons of solid waste in 2010.

Table 3.15-1: Benton County Solid Waste Projections

Year	2010 (Actual)	2025 (Projected)	2030 (Projected)	2032 (Projected)
Waste Generated (tons)	263,603	326,505	346,517	350,206

Source: Benton County 2014

By 2032, Benton County anticipates that it may need to dispose of approximately 86,500 more tons of solid waste annually than in 2010. Benton County attributes the additional solid waste to projected population growth (Benton County 2014).

Columbia Ridge Landfill in Arlington, Oregon, receives most of the waste disposed of by Benton County. Other major landfills used for disposal of waste from Benton County include Horn Rapids Landfill in the City of Richland and Finley Buttes Regional Landfill in Morrow County, Oregon (Benton County 2014).

The following describes each of the three landfills that local vendors use for permanent solid waste disposal:

- **Columbia Ridge Landfill**: Columbia Ridge Landfill and Green Energy Plant (Columbia Ridge) provides disposal services for communities, businesses, and industries, primarily from Oregon and Washington. Columbia Ridge is a modern Subtitle D landfill that accepts primarily municipal solid waste (MSW) and industrial and special wastes. Columbia Ridge is permitted by the Oregon Department of Environmental Quality (DEQ) and is in full compliance with DEQ rules and regulations. Columbia Ridge Landfill was opened in 1990 and has a life expectancy of approximately 143 years and a permitted remaining capacity of 329 million tons. The landfill's recycling services include electronic waste and white goods. The landfill does not accept appliances, batteries, discarded vehicles, hazardous wastes, loose sharps, tires, or used oil (Waste Management 2019).
- **Horn Rapids Landfill**: Horn Rapids Landfill is owned and operated by the City of Richland Public Works Department. The landfill began receiving waste in 1974 and receives municipal garbage and yard waste. Horn Rapids Landfill receives the following waste streams as part of its waste disposal program: used motor oil (5-

gallon limit per visit), antifreeze, cooking oil, automotive batteries, rechargeable batteries, and propane tanks and canisters. The landfill has an existing permitted footprint of 46 acres (City of Richland, Washington 2017).

- **Finley Buttes Landfill**: Finley Buttes Landfill is a modern MSW disposal facility permitted by the DEQ and is in full compliance with DEQ rules and regulations. The site accepts MSW, construction and demolition wastes, and special wastes (including liquids) with proper approval. The landfill does not accept old paints, chemicals, and cleaning supplies. The landfill began operations in 1991 and receives over 500,000 tons of MSW annually. Finley Buttes Landfill is 1,800 acres and is the second largest landfill in Oregon. As of 2015, its estimated available fill capacity was approximately 132 million tons of MSW. Currently, the site receives around 500,000 tons of MSW each year. The permitted life span of the landfill is approximately 300 years (Clark County, Washington 2015).

Currently, there are four certified waste haulers operating in Benton County. Solid waste collection in unincorporated Benton County is provided under certificates granted by the UTC. The following describes the four waste haulers whose service areas intersect the Lease Boundary and their waste transportation procedures:

- **Basin Disposal, Inc. (BDI)**: This waste hauler serves eastern Benton County. BDI first transports waste to the BDI transfer station in Pasco, Washington, and then hauls the waste to Finley Buttes Landfill in Boardman, Oregon, for disposal.
- **Ed's Disposal, Inc.**: This waste hauler serves central Benton County. Like BDI, Ed's Disposal, Inc., first transports waste to the BDI transfer station in Pasco and then hauls the waste to Finley Buttes Landfill in Boardman, Oregon, for disposal.
- **Sanitary Disposal, Inc.**: Sanitary Disposal, Inc., serves southwestern Benton County. Waste collected by Sanitary Disposal is transported to a transfer station in Umatilla County, Oregon, prior to disposal at Finley Buttes Landfill.
- **Waste Management of Kennewick (Waste Management)**: Waste Management serves areas throughout unincorporated Benton County. Waste collected by Waste Management is transported to its transfer station in Kennewick and then hauled to Columbia Ridge Landfill in Arlington, Oregon, for disposal (Benton County 2014).

Recycling Options

Within Benton County, Ray Poland and Sons, Inc. receives recyclable construction debris and waste including asphalt, wire mesh, concrete, and concrete with rebar (Benton County n.d.). Waste Management accepts recyclable paper, plastic bottles, and metal cans and containers at their waste transfer station at 2627 S. Ely Street, Kennewick, Washington. E-Cycle Washington is a free program that makes it easy for Washington residents to recycle their broken, obsolete, or worn-out electronics. The following locations in Benton County participate in the E-Cycle Washington program and guarantee free recycling:

- Clayton Ward Recycling Center, 119 Albany Ave, Kennewick
- Clayton Ward Recycling Center, 1936 Saint St, Richland
- Goodwill Donation Centers

LightRecycle Washington is a program that accepts compact fluorescent light bulbs, as well as fluorescent tubes and high intensity discharge lights. The following locations within Benton County participate in the LightRecycle Washington program:

- Ace Hardware & Sporting Goods, 2831 W Kennewick Ave, Kennewick
- Batteries Plus Bulbs, 321 N Columbia Center Blvd, Kennewick
- Ace Hardware & Sporting Goods, 103 Keene Road, Richland
- Grigg's Department Store Ace Hardware, 1415 George Washington Way, Richland
- Patnode's True Value, 600 9th St, Benton City (City of Richland, Washington 2022)

Streets

The roadway transportation system in Benton County consists of interstate highways, state highways, collectors, and local access routes. Benton County's principal road concerns in rural areas are "all weather" access for agricultural product transport and more direct "farm to market" routes for agricultural products. As noted, Sections 3.14 and 4.14, Transportation, evaluate the Project's impact on streets.

3.16 Socioeconomics

This section describes existing socioeconomic conditions in the proposed Horse Heaven Wind Farm (Project or Proposed Action) vicinity. The Project vicinity includes the areas 4 miles south/southwest of the City of Kennewick, Washington, and the larger Tri-Cities urban area along the Columbia River. This evaluation of socioeconomics was prepared in alignment with Washington Administrative Code (WAC) 463-60-535 and describes existing demographics, labor market and economic conditions, and public services related to socioeconomic conditions within the study area (defined below). Section 4.16 provides an evaluation of potential impacts of the Proposed Action and the No Action Alternative on socioeconomics.

Sections 3.13 and 4.13, Public Health and Safety, focus on the availability of public service agencies and medical facilities (e.g., law enforcement, fire protection, and medical emergency services) within the vicinity of the Lease Boundary. Sections 3.15 and 4.15, Public Services and Utilities, focus on utilities that serve the Project vicinity.

Regulatory Setting

WAC 463-60-535 states that an Application for Site Certification:

> *…shall include a detailed socioeconomic impact analysis which identifies primary, secondary, positive as well as negative impacts on the socioeconomic environment in the area potentially affected by the project, with particular attention to the impact of the proposed facility on population, work force, property values, housing, health facilities and services, education facilities, governmental services, and local economy.*

WAC 463-60-535 requires that an evaluation of socioeconomics include the area that employment related to a proposed action may affect within a 1-hour commute distance of the project site. WAC 463-60-535 states that an analysis of socioeconomics shall use the most recent data as published by the U.S. Census Bureau or State of Washington sources. The study area for socioeconomics, therefore, includes the area within the Lease Boundary and the populations of Benton, Franklin, Walla Walla, and Yakima Counties. Although the Oregon counties of Morrow and Umatilla are within a 1-hour commute of the Lease Boundary, this discussion of socioeconomics focuses solely on populations governed under the State of Washington’s constitution.

WAC 197-11-448 identifies general welfare, social, and economic standing as conditions that contribute to an area’s quality of life. WAC 197-11-448 states that agencies have the option to combine a review of socioeconomics with the preparation of an environmental impact statement.

In 2021, the State of Washington legislature passed Revised Code of Washington (RCW) 70A.02 to reduce environmental and health disparities in the state and improve the health of all Washington State residents. RWC 70A.02 codified the state’s approach to environmental justice (EJ) into law. The code requires that all covered agencies comply with all provisions of the statute, while all other state agencies should strive to apply the laws of the State of Washington, and the rules and policies of the agency, in accordance with the policies of RWC 70A.02, to the extent feasible.

The State of Washington’s Growth Management Act (GMA) is a series of state statutes that require counties and cities whose population growth exceeds stated thresholds to develop a comprehensive plan that assists in managing their population growth. Due to the impact of population growth on housing affordability and availability and economic conditions, the following are additional provisions associated with the GMA under Chapter 36.70A RCW that are applicable to a review of socioeconomics:

- RCW 36.70A.010 states that the legislature finds that uncoordinated and unplanned growth, together with a lack of common goals expressing the public's interest in the conservation and the wise use of Washington's lands, pose a threat to the environment; sustainable economic development; and the health, safety, and high quality of life enjoyed by the State of Washington's residents.
- RCW 36.70A.010 states that it is in the public interest that citizens, communities, local governments, and the private sector cooperate and coordinate with one another in comprehensive land use planning.
- RCW 36.70A.010 states that it is in the public interest that economic development programs be shared with communities experiencing insufficient economic growth.
- RCW 36.70A 115 states that counties and cities that are required or choose to plan under RCW 36.70A.040 shall ensure that, taken collectively, adoption of and amendments to their comprehensive plans and/or development regulations provide sufficient capacity of land suitable for development within their jurisdictions to accommodate their allocated housing and employment growth, including the accommodation of, as appropriate, the medical, governmental, educational, institutional, commercial, and industrial facilities related to such growth, as adopted in the applicable countywide planning policies and consistent with the 20-year population forecast from the Washington State Office of Financial Management (OFM).
- RCW 43.62.030 states that the OFM shall annually determine the populations of all cities and towns of the state as of April 1. State agencies should use OFM population estimates for cities and towns in state program administration and in the allocation of selected state revenues.

The U.S. Environmental Protection Agency (EPA) defines EJ as the "fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies" (EPA 2016).

The EPA defines the term "fair treatment" to mean that "no group of people should bear a disproportionate burden of environmental harms and risks, including those resulting from the negative environmental consequences of industrial, governmental, and commercial operations or programs and policies." The term "disproportionate impacts" refer to differences in impacts or risks that are extensive enough that they may merit action. (EPA 2016)

In accordance with Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, each federal agency "shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." The Executive Order makes clear that its provisions apply fully to programs involving Native Americans" (CEQ 1997). According to RCW 70A.02.010, EJ means:

> "*The fair treatment and meaningful involvement of all people regardless of race, color, national origin or income with respect to the development, implementation, and enforcement of environmental laws, regulations and policies. This includes using an intersectional lens to address disproportionate environmental and health impacts by prioritizing highly impacted populations, equitably distributing resources and benefits, and eliminating harm" (RCW 70A02).*

Background

The Benton-Franklin Council of Governments (BFCOG) administers the Benton-Franklin Economic Development District (BFEDD). The BFCOG is the regional economic planning agency for Benton and Franklin Counties. Since 2014, the Benton and Franklin County region has experienced an increase in both population and economic growth. According to the BFEDD, economic growth measured by increases in employment opportunities through local businesses within the region grew by 2.1 percent per year between 2013 and 2019. This expansion in local employment contributed to the region's increase in gross domestic product of 3.5 percent per year since 2013 (BFCOG 2021).

Benton and Franklin Counties also contain the Kennewick-Richland Metropolitan Statistical Area (MSA). MSAs consist of integrated geographic regions typically made up of an urbanized economic core and economically related counties (U.S. Census Bureau 2020a). The U.S. Office of Management and Budget delineates MSAs according to published standards that are applied to U.S. Census Bureau data.

The general concept of an MSA is that of a core area containing a substantial population nucleus, together with adjacent communities having a high degree of economic and social integration with that core. The Tri-Cities of Kennewick, Pasco, and Richland are the core of the Kennewick-Richland MSA. Benton and Franklin are economically related counties that share a high degree of economic integration with the urbanized core and one another.

3.16.1 Affected Environment

Benton County is in southeastern Washington State. The Columbia River bounds Benton County to the north, east, and south, while Klickitat and Yakima Counties bound Benton County to the west. Benton County is predominantly rural and agricultural in nature, with unincorporated areas making up most of the jurisdiction. The Project's Lease Boundary is south of the Tri-Cities. Kennewick and Richland are located within Benton County, while Pasco is located in Franklin County.

As previously noted, WAC 463-60-535 states that the study area for socioeconomic impacts shall include the area that may be affected by employment within a 1-hour commute distance of the project site. In addition to Benton and Franklin Counties, Walla Walla and Yakima Counties in Washington are also within a 1-hour commute of the Lease Boundary.

3.16.1.1 Population and Growth Rate

Increases in population can occur from either net in-migration or natural increase. Net in-migration occurs when more people move to an area than leave. Natural increase occurs when there are more births than deaths (OFM 2022a). The State of Washington's approximate population is 7,766,975 (OFM 2022b). Since 2010, the State of Washington's population has been growing at an average of over 100,000 persons per year. Between 2011 and 2021, in-migration accounted for 66 percent of Washington's population growth. Correspondingly, natural increases in population growth accounted for the remaining 34 percent. The OFM's projections for the state's population suggest that the pace of growth is likely to increase over the ensuing decades.

As shown in **Table 3.16-1**, Benton County had an estimated population of 209,400 as of 2021. This ranks Benton County as the 10th most populated county in the State of Washington (OFM 2022b).

Table 3.16-1: Population (Postcensal Estimates) and Growth Management Act Mid-Level Growth Rate Projections

Location	2011 Population	2021 Population	Average Annual Growth Rate (2011–2021)	2030 Projection	2040 Projection	2050 Projection
Benton County	177,900	209,400	17.7 %	228,162	250,524	267,139
Benton City	3,145	3,500	11.3 %	Not Available	Not Available	Not Available
Kennewick	74,665	84,620	13.3 %	Not Available	Not Available	Not Available
Prosser	5,780	6,130	6.1 %	Not Available	Not Available	Not Available
Richland	49,090	61,320	24.9 %	Not Available	Not Available	Not Available
West Richland	12,200	17,070	39.9 %	Not Available	Not Available	Not Available
Franklin County	80,500	98,350	22.2 %	127,443	158,574	182,589
Connell	5,150	5,125	-0.48 %	Not Available	Not Available	Not Available
Kahlotus	190	145	-23.7 %	Not Available	Not Available	Not Available
Mesa	495	390	-21.2 %	Not Available	Not Available	Not Available
Pasco	61,000	78,700	29.0 %	Not Available	Not Available	Not Available
Walla Walla County	58,800	62,100	5.6 %	59,036	58,963	58,573
Yakima County	244,700	258,100	5.5 %	246,914	252,912	258,007
State of Washington	6,767,900	7,766,975	14.7 %	8,503,178	9,242,022	9,855,117

Sources: OFM n.d.(b), n.d.(c)
Note: Postcensal data for each calendar year between the census and the current year are updated annually using information on the components of population change.

An estimated 82 percent of Benton County's population lives in one of five incorporated communities. Of the county's incorporated communities, Kennewick has the largest population, with 84,620 residents. Kennewick's population accounts for approximately 40 percent of the county's total population. Richland is the second largest incorporated community within Benton County with a total population of 61,320 residents (OFM n.d.[b]). Benton County had an average population density of 123.17 persons per square mile in 2021. Benton County's population density is greater than the statewide average of 116.88 persons per square mile (OFM n.d.[d]).

Benton County's total population increased by 31,500 people or 17.7 percent between 2011 and 2021. Benton County's increase in population exceeded the state average of approximately 14.7 percent (OFM n.d.[e]). When compared to the state's population growth, migration played a slightly smaller role in Benton County's increase. In-migration accounted for approximately 63 percent of the county's growth in population over this period. Natural increase accounted for the remaining 37 percent (OFM n.d.[e]).

In 2021, Franklin County's estimated population was 98,350. Pasco is the largest incorporated community in Franklin County, with a population of 78,700. Franklin County had an average population density of 79.21 persons per square mile in 2021, compared to a statewide average of 116.88 persons per square mile (OFM n.d.[b], n.d.[d]). The total population in Franklin County increased by more than 17,850 people, or 22 percent, between

2011 and 2021. Franklin County's population growth rate exceeded the state's average of 14.7 percent over the same period. Natural increase accounted for more than 65 percent of Franklin County's population growth, with net in-migration making up the remaining 35 percent (OFM n.d.[e]).

In 2021, the populations of Walla Walla and Yakima Counties were 62,100 and 258,100, respectively. The largest incorporated community in Walla Walla County is the City of Walla Walla, with a 2021 population of 33,680. The largest incorporated community in Yakima County is the City of Yakima, with a population of 97,810. The population density for Walla Walla County in 2021 was 48.90 persons per square mile, while the population density of Yakima County was 60.10 persons per square mile. The population densities of Walla Walla and Yakima Counties are approximately half the statewide average of 116.88 persons per square mile (OFM n.d.[b], n.d.[d]).

Population Projections

The OFM prepares county population projections for planning under Washington State's GMA. The OFM prepares high-, medium-, and low-growth expectations for each county, with the medium series considered the most likely because it is based on assumptions that have been validated with past and current information. Current projections developed in support of the GMA extend through 2040, with supplemental projections developed from 2040 through 2050. **Table 3.16-1** presents projection data based on the OFM's medium growth scenario.

From 2021 to 2030, the populations of Benton and Franklin Counties are projected to increase by approximately 9 percent and 30 percent, respectively. These percentages indicate that Benton County's percent increase in population would be similar to that of the State of Washington's (9 percent) over the same nine-year period. As noted, Franklin County is projected to experience a much higher percent growth rate than either Benton County or the State of Washington over the same nine-year period (OFM n.d.[e]).

As shown in **Table 3.16-1**, the OFM has projected population growth for Benton and Franklin Counties as far out as 2050. The projected 17 percent increase in population for Benton County during the 20-year period between 2030 and 2050 is anticipated to be slightly higher than the State of Washington's 15 percent increase over the same period. Franklin County's 43 percent increase in population from 2030 to 2050 is expected to be almost three times the percent increase that Washington is projected to experience over the same period (OFM n.d.[e]).

From 2021 to 2030, population is projected to increase by approximately 6 percent and 5 percent in Walla Walla and Yakima Counties, respectively. The projected growth rates for Walla Walla and Yakima Counties suggest a slower increase in population for these counties than expected for the State of Washington or Benton and Franklin Counties over the same nine-year period. For the 20-year period from 2030 to 2050, the OFM has projected that the population of Walla Walla County would decrease by less than 1 percent. Over the same 20-year period, Yakima County's population is expected to increase by 4 percent. Both percent changes in population would be far less than the 15 percent increase in population that the OFM has projected for the State of Washington as a whole (OFM n.d.[e]).

3.16.1.2 People of Color Populations

The White House Council on Environmental Quality (CEQ) guidance states that "minority populations should be identified where either: a) the minority population of the affected area exceeds 50 percent; or b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographical analysis" (CEQ 1997).

The selection of the appropriate unit of geographic analysis may be a governing body's jurisdiction, a neighborhood, a census tract, or other similar unit chosen so as to not artificially dilute or inflate the affected minority population (CEQ 1997).

Table 3.16-2 presents race and ethnicity data from the U.S. Census Bureau's 2020 Decennial (every 10 years) Census of Population and Housing for the study area. According to the most recent census estimates, approximately 64 percent of the population of Washington State is white. Persons of Hispanic or Latino origin were identified as the single largest people of color group, accounting for 14 percent of the state's total population. In Benton County, 66 percent of the population identified themselves as white alone, while approximately 24 percent of Benton County's population identified themselves as Hispanic alone. The percentage of Benton County's population that identifies themselves as Hispanic alone is higher than the statewide average of 14 percent (U.S. Census Bureau 2021a).

Table 3.16-2: Breakdown by Race and Ethnicity by City and County (2020 Decennial Census) for the Project Study Area

Location	Total Population for Whom Race Status Is Determined	White Alone (%)	Hispanic Alone (%)	Other Races (%)	All People of Color (Hispanic and Other Races) (%)
Benton County	206,873	66	24	6	29
Benton City	3,479	59	35	3	37
Kennewick	83,921	59	30	6	36
Prosser	6,062	47	46	4	50
Richland	60,560	73	13	8	21
West Richland	16,295	77	14	4	18
Franklin County	96,749	38	54	5	59
Connell	5,441	43	41	12	53
Kahlotus	147	73	18	1	20
Mesa	385	19	76	2	78
Pasco	77,108	35	58	4	62
Walla Walla County	62,584	68	23	4	27
Yakima County	256,728	40	51	6	57
State of Washington	7,705,281	64	14	16	30

Source: U.S. Census Bureau 2021a
Note:
Total population percentages may not equal 100 percent due to rounding.

Six census block groups intersect with or are located adjacent to the Project Lease Boundary (**Figure 3.16-1**). A census block group is a statistical subdivision of a census tract, generally defined to contain between 600 and 3,000 people and 240 and 1,200 housing units (U.S. Census Bureau 2021b). **Table 3.16-3** and **Figure 3.16-1** present race and ethnicity data for the six census block groups that intersect with or are adjacent to the Lease Boundary.

Table 3.16-3: Race and Ethnicity of Census Block Groups Intersecting the Project Lease Boundary

Lease Boundary	Total Population for Whom Race States Is Determined	White Alone	White Alone (%)	Hispanic Alone	Hispanic Alone (%)	Other Races Alone	Other Races (%)	All People of Color (Hispanic and other Races)	All People of Color (Hispanic and Other Races) (%)
Census Tract 108.07, Block Group 1	1,558	1,194	77	232	15	63	4	295	19
Census Tract 108.14, Block Group 1	5,129	4,286	84	406	8	194	4	600	12
Census Tract 115.01, Block Group 1	1,392	966	69	344	25	28	2	372	27
Census Tract 115.06, Block Group 1	2,161	1,755	81	171	8	132	6	303	14
Census Tract 116, Block Group 1	835	442	53	366	44	11	1	377	**45**
Census Tract 118.01, Block Group 3	898	705	79	133	15	25	3	158	18
Block Group Totals	11,973	9,348	78	1,652	14	453	4	2,105	18
Benton County	206,873	135,718	66	49,339	24	11,641	6	60,980	29[(a)]

Source: 2020 Decennial Census (U.S. Census Bureau 2021a)
Note:
(a) Reference threshold for the analysis of people of color
Total percent population may not be equal to 100 percent due to rounding.
Bold values = Percentage of people of color that are greater than reference threshold

When comparing the percentage of people of color who reside in Benton County (29 percent) to the percentage of people of color who reside in other counties within the socioeconomic study area (**Table 3.16-2**), the percentage of people of color population within the Benton County (29 percent) is considered a conservative reference threshold for people of color analysis within the identified six census block groups that intersect with or are adjacent to the Lease Area.

White alone represents the majority population in all six census block groups. The percentage of white residents ranges from 53 to 84 percent within the six block groups. For most of the block groups (four out of six block groups), people of color range between 8 and 15 percent for the Hispanic population. Percent for other races range between 1 and 6 percent for all census block groups. The percentage of people of color for the six census block groups combined (18 percent) is well below the identified threshold for this analysis (29 percent). However, the people of color population in Census Tract 116, Block Group 1 (45 percent) is greater than this value for Benton County as a whole (29 percent), which is the identified reference community in this study.

Census Tract 116, Block Group 1, spans a very large area, with the majority falling outside the Project Lease Boundary. This census block group is among the least populated of the census block groups, but it is the largest census block group that intersects with the Project Lease Boundary. Review of arial imagery indicated that this block group contains little built-up development, and proximity values to other EJ indicators, such as superfund, traffic, and hazardous waste, are low in this area (**Appendix 3.16-1**) (EJ Screen 2022).

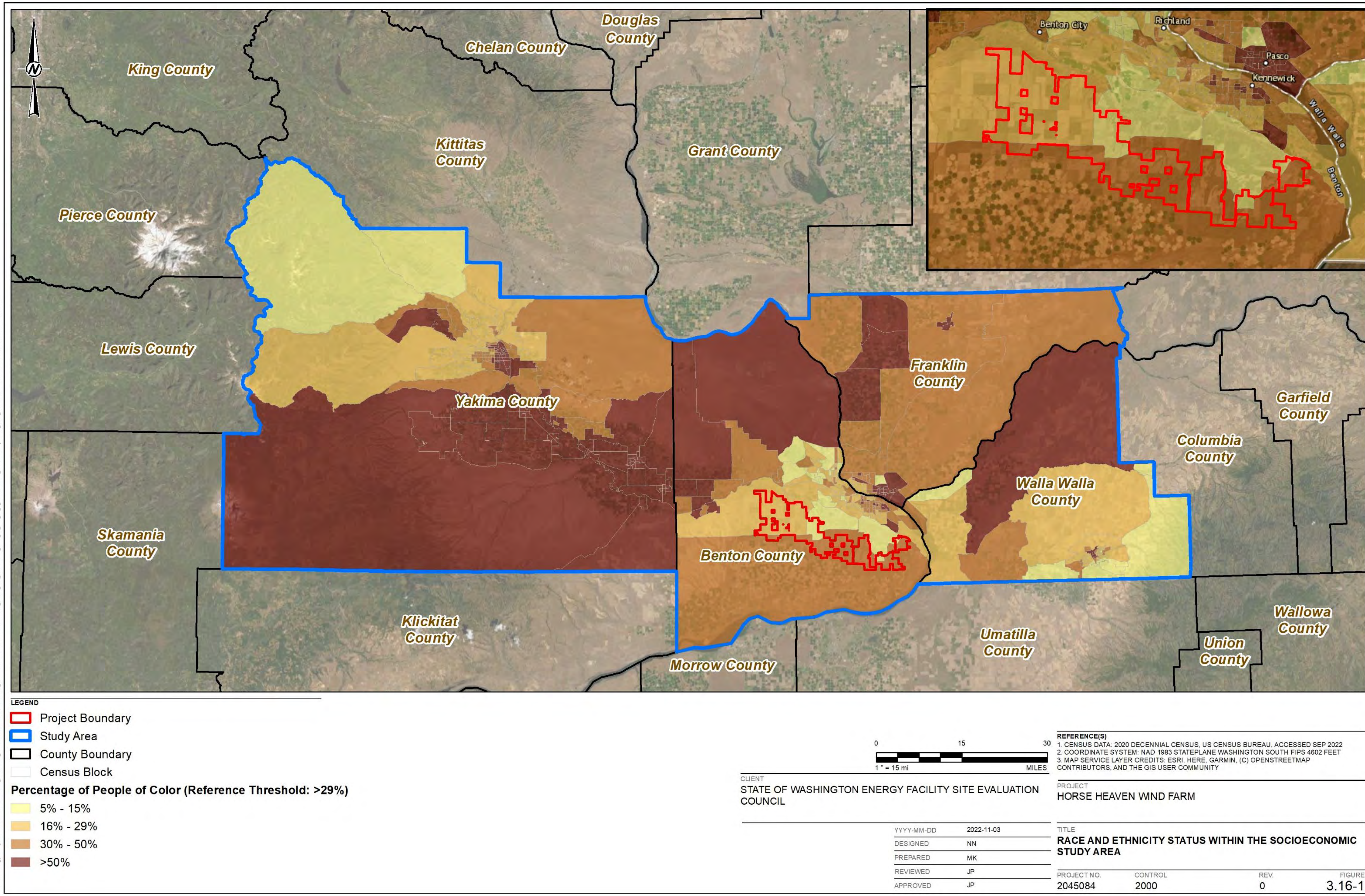


Figure 3.16-1: Race and Ethnicity Status

3.16.1.3 Low-income Population

According to the CEQ, a community that has a significant amount of its population living at or below the poverty level could be considered a low-income community (CEQ 1997). RCW 19.405.020 defines low-income as follows:

> *Household incomes as defined by the department or commission, provided that the definition may not exceed the higher of eighty percent of area median household income or two hundred percent of the federal poverty level, adjusted for household size.*

In accordance with RCW 19.405.020, this analysis defines low-income as individuals who make less than 200 percent of the federal poverty level, adjusted for household size.

Table 3.16-4 shows income and poverty data for the Project's socioeconomic study area. The estimated share of total households below the poverty level in Washington State is 11 percent. Poverty levels were slightly higher in Benton County (12 percent) and Franklin County (15 percent). Similarly, the estimated shares of total households below the poverty level were 13 percent in Walla Walla County and 17 percent in Yakima County. In Benton County, the share of households below the poverty level in its five incorporated communities ranged from about 8 percent in West Richland to 18 percent in Prosser. In Franklin County, the share of households below the poverty level in its four incorporated communities ranged from about 9 percent in Kahlotus to 29 percent in Mesa (U.S. Census Bureau 2020b).

Table 3.16-4: Household Income Level within the Project Study Area

Geographic Area	Median Household Income	Mean Household Income
Benton County	$69,023	$87,525
Benton City	$55,175	$64,786
Kennewick	$59,533	$74,073
Prosser	$50,164	$57,745
Richland	$77,686	$99,631
West Richland	$99,817	$108,641
Franklin County	$63,584	$79,145
Connell	$51,154	$55,688
Kahlotus	$51,250	$54,681
Mesa	$50,000	$61,620
Pasco	$62,775	$77,031
Walla Walla County	$57,858	$76,351
Yakima County	$51,637	$69,036
State of Washington	$73,775	$98,983

Note: Adjusted for inflation in 2019 dollars
Source: U.S Census Bureau American Community Survey 5-year estimate (U.S. Census Bureau 2020b)

As shown in **Table 3.16-4**, median incomes were below the state average in Benton, Franklin, Walla Walla, and Yakima Counties. This was also the case for the incorporated communities of Benton and Franklin Counties, with the exceptions of Richland and West Richland, Washington.

Table 3.16-5 presents the low-income data for the Project's socioeconomic study area. In comparison to the State of Washington, the low-income level in the study area was the highest in Yakima County (6 percent of low-income population in the State of Washington), followed by Benton County (3 percent of low-income population in the

State of Washington). This value for the study area (Benton, Franklin, Walla Walla, and Yakima Counties together) is 11.62 percent, indicating that the low-income population within the study area represents 11.62 percent of the low-income population within the State of Washington.

Table 3.16-5: Low-income Status Within the Project Study Area

Lease Boundary	Total Population for Whom Income Status Is Determined	Low-income Population (All Individuals with Income below the Poverty Ratios – 200 Percent)	Percentage of low-income Population (Comparison to Total Population) (%)	Comparison of All Individuals with Income Below the Poverty Ratios – 200 Percent and this Value for the State of Washington (%)
Benton County	198,731	52,180	26	3
Franklin County	90,828	30,749	34	1.7
Walla Walla County	55,803	17,142	31	1
Yakima County	246,943	106,806	43	6
Benton, Franklin, Walla Walla, and Yakima Counties combined	592,305	206,877	35	11.62
State of Washington	7,372,433	1,780,174	24	-

Source: U.S. Census Bureau, American Community Survey, Table S1701, Poverty Status in the past 12 months, 2020 (U.S. Census Bureau 2020b)

Because of the location of the Project, and the fact that Benton County has the lowest percentage of low-income individuals in comparison to other counties within the Project study area, Benton County was selected as the most conservative reference community, and therefore the percentage of low-income individuals in Benton County (26 percent) was used as the conservative reference threshold for the analysis of low-income status in this study.

Table 3.16-6 and **Figure 3.16-2** present low-income data for the census block groups that intersect with or are adjacent to the Project Lease Boundary. The total population of low-income individuals within the studied census block groups (1,721) constitutes 3.3 percent of the total population of low-income individuals within Benton County as a whole (52,180), while the total population for whom income status is determined within the studied census block groups (12,637) constitutes 6.3 percent of the total population within Benton County (198,731).

Table 3.16-6: Low-income status of Census Block Groups Intersecting the Project Lease Boundary

Geographic Area	Total Population for Whom Income Status is Determined	Low-income Population (All Individuals with Income Below the Poverty Ratios – 200 Percent)	Percentage of low-income Population (Comparison to Total Population) (%)	Percent of Low-income Population (Comparison to Benton County Low-income Population) (%)
Census Tract 108.07, Block Group 1	1772	330	19	0.63
Census Tract 108.14, Block Group 1	5,250	414	8	0.8
Census Tract 115.01, Block Group 1	1,077	446	**41**	0.85
Census Tract 115.06, Block Group 1	2,736	51	2	0.1
Census Tract 116, Block Group 1	977	224	23	0.43
Census Tract 118.01, Block Group 3	825	256	**31**	0.49
Census Block Groups Totals	12,637	1,721	14	3.3
Benton County	198,731	52,180	26[(a)]	-
State of Washington	7,372,433	1,780,174	24	-

Source: U.S. Census Bureau, America Community Survey, Table S1701, Poverty Status in the past 12 months, 2020 (U.S. Census Bureau 2020b)
Note:
[(a)] = Reference threshold for the analysis of low-income communities
Bold = Percentage of low-income communities that is greater than the reference threshold.

While the percentage of low-income population for the six census block groups combined (14 percent) is well below the identified low-income threshold for this analysis (26 percent), Census Tract 115.01, Block Group 1 and Census Tract 118.01, Block Group 3 with 41 percent and 31 percent of low-income population, respectively, supersede the low-income threshold (26 percent) and are identified as low-income communities.

Census Tract 115.01, Block Group 1, with low-income population of 41 percent, is the only census block group (among the six) that is completely outside the Project Lease Boundary but is located adjacent to the Project Lease Boundary. This census block group is also among the least populated block groups (1,077 individuals for whom income status is determined). Review of aerial imagery indicated a low amount of built-up development and dispersed housing in the majority of the areas within this census block group. Proximity values to other EJ indicators, such as superfund, traffic, and hazardous waste are low for this census block group (**Appendix 3.16-1**) (EJ Screen 2022).

Similarly, while Census Tract 118.01, Block Group 3, with low-income population of 31 percent, is the second largest census block group (after Census Tract 116, Block Group 1) that intersects with the Project Lease Boundary, compared to other block groups it has the lowest population of individuals for whom income status is determined. Large portions of this census block group are located outside the Project Lease Boundary. Review of the imagery indicated a very low amount of built-up areas and dispersed housing in this census block group. Also, proximity values to other EJ indicators, such as superfund, traffic, and hazardous waste are low for this census block group (**Appendix 3.16-1**) (EJ Screen 2022).

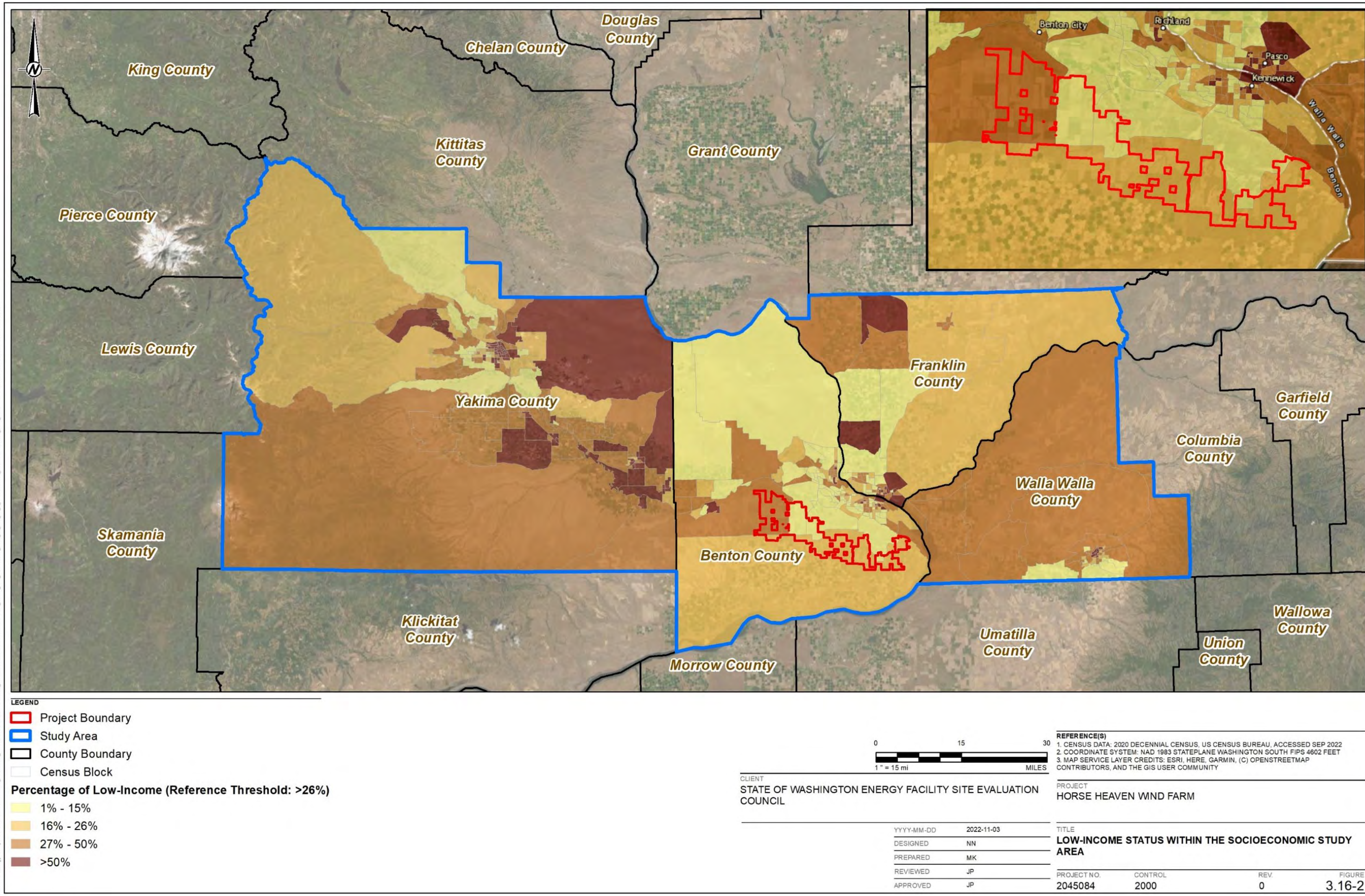


Figure 3.16-2: Low-income Status within the Socioeconomic Study Area

3.16.1.4 Economic Conditions

The economy in Benton and Franklin Counties has largely been dependent on federal funding for Hanford Site projects. Employment in the Hanford area has decreased in recent years as part of federal spending cuts. This decrease was part of a region-wide decline in employment between 2012 and 2013 and the end of American Recovery and Reinvestment Act funding (BFCOG 2021).

As the Hanford Site's role in the region's economy decreases, agriculture, food processing, and transportation services have experienced growth in recent years. Additional economic trends within the study area relate to increases in agri-tourism. These changes in economic conditions are often associated with an emerging viticulture (wine) industry and specialty crop farming and tourism-related commercial and recreational activities. The region's tourism activities are often associated with the Snake, Columbia, and Yakima Rivers (Benton County 2021a).

3.16.1.5 Fiscal Conditions

Fiscal policy is the use of government spending and taxation to influence the economy. Governments typically use fiscal policy to promote strong and sustainable growth and reduce poverty. The following describes the existing fiscal conditions of the four Washington counties in the study area:

- Benton County's most recent financial statement filed with the Office of the Washington State Auditor was submitted in 2020 and covered the period from January 1, 2019 through December 31, 2019. Benton County's general fund is its principal operating reserve. The 2020 annual filing by Benton County with the Washington State Auditor indicates that the county's general fund had total revenues of approximately $69.7 million for the fiscal year that ended December 31, 2019. Taxes accounted for approximately 56 percent of the total account. In 2019, Benton County had total general fund expenditures of approximately $60.1 million, with spending on general government and public safety accounting for approximately 96 percent of the account's total distribution (Washington State Auditor 2020a).
- Franklin County's most recent financial statement filed with the Office of the Washington State Auditor was submitted in 2020 and covered the period of January 1, 2019 through December 31, 2019. Franklin County's general fund is the County's primary operating reserve and is the largest source of day-to-day service delivery. Franklin County had total general fund revenues of $29 million, with property taxes and sales and use taxes accounting for 38 percent and 24 percent of the total account, respectively. Franklin County had total general fund expenditures of approximately $31 million, with spending on general government and public safety accounting for three-quarters of the account's total distribution (Washington State Auditor 2020b).
- Walla Walla County's most recent financial statement filed with the Office of the Washington State Auditor was submitted in 2020 and covered the period from January 1, 2019 through December 31, 2019. The general fund is the chief operating reserve of Walla Walla County. Walla Walla County had total general fund revenues of approximately $18.4 million. Of the approximate $13.6 million in taxes collected, 64.3 percent was from property taxes, 35.1 from sales taxes, and 0.6 percent from other taxes. The total 2019 general fund expenditures, including transfers, were approximately $17.8 million, with spending on general government and public safety accounting for 89 percent of the account's total distribution. Both Walla Walla County's 2019 general fund revenues and expenditures slightly increased when compared with 2018 (Washington State Auditor 2020c).
- Yakima County's most recent financial statement filed with the Office of the Washington State Auditor was submitted in 2021 and covered the period January 1, 2020, through December 31, 2020. The general fund is

the chief operating reserve of Yakima County. Yakima County's general fund had a revenue increase of over $13 million from 2019 revenue. The major increase of over $12 million is attributed to intergovernmental revenues dealing with COVID-19 funds. In 2020, Yakima County had general fund revenues of $80.4 million. Yakima County's general fund expenditures in 2020 were $61.2 million, with spending on general government and public safety accounting for 89 percent of the account's total distribution (Washington State Auditor 2020d).

3.16.1.6 Taxation

In accordance with RCW 82.08.020, the State of Washington imposes a sales and use tax of 6.5 percent. Sales tax applies to most retail sales of "tangible personal property" within Washington, including some services such as lodging and related services. Use taxes are equivalent to sales taxes and apply to taxable purchases made out of state for use in Washington. State sales and use tax revenues are deposited in the state general fund.

In addition to the 6.5 percent state sales and use tax, local governments can impose local sales taxes on the same tax base as the state. Cities and counties can impose up to 1 percent in "unrestricted" sales taxes that may be used for any lawful government purpose, as well as a number of "restricted" local sales taxes that may only be used for specific purposes (Municipal Research and Services Center 2022). The following describes the 2022 sales tax rates for the counties that occur within the study area (Washington State Department of Revenue 2021):

- **Benton County:** The overall local sales tax total for unincorporated Benton County is 2.1 percent.
- **Franklin County:** the overall local sales tax total for unincorporated Franklin County is 2.1 percent.
- **Walla Walla County:** The overall local sales tax for unincorporated Walla Walla County is 1.5 percent.
- **Yakima County:** The overall local sales tax for unincorporated Yakima County is 1.5 percent.

The State of Washington provides a sale and use tax exemption to wind and solar facilities with a generating capacity over 1 kilowatt. The exemption may be claimed in the form of a sales or use tax remittance of 50, 75, or 100 percent of the sales or use tax paid on qualified machinery and equipment, and installment labor and services (RCW 82.08.962; RCW 82.12.962). The amount of the remittance is determined by criteria established by the Washington Department of Labor and Industries and applied for through the Washington Department of Revenue. The program applies to projects commenced after January 1, 2020, and completed by December 31, 2029 (RCW 82.08.962).

Property taxes are a primary source of revenue for counties in Washington State. The property tax system in Washington State is a "budget-based" system, which means that counties and other taxing districts first establish the total dollar amount of property tax revenue they wish to generate in the upcoming year. Once this amount is established, the county assessor then calculates the applicable levy rate based on the total assessed value of all properties in the county.

The total dollar amount of property taxes to be collected in one year is known as the levy amount. In Washington, the amount the levy can grow from year to year is limited by the "levy lid," also known as the "1% increase limit" or "101% limit." For counties with more than 10,000 residents, like Benton County, annual increases in the levy amount cannot exceed 1 percent or the rate of inflation, whichever is lower, plus an additional amount generated by new construction and "add-ons." These "add-ons" include increases in assessed valuation from the previous year due to new construction and property improvements and construction of renewable energy electricity-generating facilities, including turbine and solar facilities (RCW 84.55.010; Horse Heaven Wind Farm, LLC 2021).

Individual government units with property tax authority in Benton County include the state, county, cities, school districts, hospitals, libraries, and fire districts. These government units, known as taxing districts, combine to form Tax Areas, which represent unique combinations of overlapping taxing districts. The resulting combined levy or millage rate varies by Tax Area (Horse Heaven Wind Farm, LLC 2021). The following describes the property tax process for the State of Washington and Benton County:

- The levy, or millage (mills) rate, which determines the amount an individual property owner owes, is expressed as a dollar amount per $1,000 assessed value. A jurisdiction with a levy rate of 10 mills would impose tax at the rate of $10 per $1,000 of property value.
- The Washington State Constitution requires that levy rates are uniform for all properties within a taxing district. The one exception to this requirement is for agricultural, timber, and open space land.
- The Benton County Levy Rates report for 2021 identified 52 Tax Areas, with corresponding levy rates ranging from 7.37 to 12.8 mills (Benton County 2021b).

3.16.1.7 Workforce and Economics

The region has experienced an increase in economic activities through job expansion in multiple industries. The increase in job opportunities has helped the region retain population and encourage in-migration. The diversity in workforce participation includes professional and technical services, healthcare, education, construction, manufacturing, retail trade, transportation, warehousing, and agriculture (BFCOG 2021). **Table 3.16-7** presents employment data by economic sector for the study area.

Table 3.16-7: Employment by Economic Sector

Economic Sector	Benton County	Franklin County	Walla Walla County	Yakima County	State of Washington
Total employment	111,173	42,590	36,328	132,124	4,385,827
Farm employment	5,124	4,030	3,535	19,290	90,166
Nonfarm employment	106,049	38,560	32,793	112,834	4,295,661
Private nonfarm employment	93,565	31,639	26,514	94,702	3,655,279
Forestry, fishing, and related activities	NA	NA	NA	10,470	43,128
Mining, quarrying, and oil and gas extraction	NA	NA	NA	95	8,601
Utilities	165	NA	143	175	5,861
Construction	9,124	3,209	1,519	5,409	271,188
Manufacturing	4,892	3,850	4,330	8,570	289,614
Wholesale trade	1,629	2,068	911	4,951	141,805
Retail trade	11,803	4,140	3,007	12,896	458,066
Transportation and warehousing	2,352	NA	725	4,680	189,866
Information	778	177	323	650	160,563
Finance and insurance	3,794	712	1,100	2,939	172,563
Real estate and rental and leasing	3,875	1,377	1,168	3,655	202,481
Professional, scientific, and technical services	11,151	1,176	NA	3,268	343,000
Management of companies and enterprises	611	46	NA	754	48,440

Table 3.16-7: Employment by Economic Sector

Economic Sector	Benton County	Franklin County	Walla Walla County	Yakima County	State of Washington
Administrative and support and waste management and remediation services	11,405	1,519	NA	3,038	213,476
Educational services	1,111	614	NA	1,974	78,717
Health care and social assistance	15,043	3,744	NA	18,282	491,237
Arts, entertainment, and recreation	1,544	411	NA	1,359	80,819
Accommodation and food services	7,281	2,043	NA	6,437	247,746
Other services (except government and government enterprises)	4,850	2,196	1,607	5,100	211,128
Government and government enterprises	12,484	6,921	6,279	18,132	640,382
Federal civilian	789	499	1,983	1,289	78,622
Military	519	232	147	711	68,608
State and local	11,176	6,190	4,149	16,132	493,152
State government	1,499	1,765	1,856	2,947	152,806
Local government	9,677	4,425	2,293	13,185	340,346

Source: U.S. Bureau of Economic Analysis 2020 Data (BEA 2022a, 2022b)
NA = not available

The labor market within the State of Washington and study area is summarized as follows (BEA 2022a, 2022b):

- An estimated 111,173 people were employed in Benton County in 2020, while 42,590 were employed in Franklin County. Employment in Benton and Franklin Counties represents 3 percent and 1 percent of the State of Washington's total employment, respectively.
- An estimated 36,328 people were employed in Walla Walla County, and 132,124 were employed in Yakima County in 2020. Walla Walla and Yakima Counties' employed population in 2020 consisted of 1 percent and 3 percent of the State of Washington's total employment, respectively.
- In 2020, farm employment accounted for 2 percent of the state's labor market. Farm employment in the study area counties ranged between 5 and 15 percent. In Benton County, farm employment accounts for approximately 5 percent of the county's workforce.
- In 2020, the private sector employed more people than the public sector in the State of Washington and the study area. The following summarizes employment by the economic sectors that employ the greatest number of residents within the study area:
    - The two largest sectors for employment in Washington were government and health care and social assistance. Government sector jobs represented 15 percent of Washington's workforce and health care, and social assistance represented 11 percent.
    - Government sector represented between 11 and 17 percent of the workforce in Benton, Franklin, Walla Walla, and Yakima Counties in 2020.

- Similar to the State of Washington, the health care and social assistance sector was the second largest employer in Benton and Yakima Counties. Health care and social assistance represented 14 percent of employment within Benton and Yakima Counties.
- In Franklin County, retail trade at 10 percent of work was the second largest employer.

3.16.1.8 Housing

The U.S. Census Bureau defines a housing unit as a house, apartment, mobile home or trailer, group of rooms, or single room occupied or intended to be occupied as separate living quarters. **Table 3.16-8** summarizes housing resources for the State of Washington and study area. The data presented in this table are annual estimates prepared by the U.S. Census Bureau from the 2020 Decennial Census and 2019 American Community Survey 5-Year Estimate.

Table 3.16-8: Housing Characteristics for the Study Area

Geographic Area	Total Housing Units[(a)]	Occupied Housing Units[(a)]	Vacant Housing[(a)]	Median Home Value[(b)]	Median Rent Cost[(b)]
Benton County	80,076	76,369	3,707	$243,600	$974
Benton City	1,381	1,277	104	$164,000	Not Available
Kennewick	32,242	30,761	1,481	$223,000	$922
Prosser	2,346	2,164	182	$200,400	$835
Richland	25,524	24,327	1,197	$267,200	$1,087
West Richland	5,773	5,628	145	$291,700	$1,280
Franklin County	29,740	28,748	992	$216,400	$913
Connell	1,021	958	63	$129,500	$903
Kahlotus	70	59	11	$122,900	Not Available
Mesa	119	105	14	$93,600	Not Available
Pasco	24,334	23,653	681	$210,000	$922
Walla Walla County	24,971	23,082	1,889	$231,500	$926
Yakima County	90,504	85,882	4,622	$183,800	$825
State of Washington	3,202,241	2,974,692	227,549	$351,300	$1,258

Notes:
(a) 2020 Decennial Census Data (U.S. Census Bureau 2021a)
(b) ACS (2019) 5-Year Estimate Data (U.S. Census Bureau 2020b)
Not Available = Data not included in the 2019 American Community Survey 5-Year Estimate

The following describes the housing market for the four counties within the study area:

- **Benton County**: An estimated total of 3,707 units were vacant in Benton County in 2020. In 2019, the median home value in Benton County was $243,600. In 2019, there were 21,205 units with a home value less than $300,000 in Benton County. This includes 1,561 units with a value less than $100,000. In 2019, the median monthly rent in Benton County was $974. Median rent for renter-occupied units ranged from almost $835 in Kennewick to more than $1,280 in West Richland (U.S. Census Bureau 2021a, 2020b).
- **Franklin County**: An estimated total of 992 units were vacant in Franklin County in 2020. In 2019, the median home value in Franklin County was $216,400. In 2019, there were 9,692 units with a home value less than

$300,000 in Franklin County. This includes 730 units with a value less than $100,000. In 2019, the median monthly rent in Franklin County was $913. For renter-occupied units, rent ranged from almost $903 in Connell to $922 in Pasco (U.S. Census Bureau 2021a, 2020b).

- **Walla Walla County**: An estimated total of 1,889 units were vacant in Walla Walla County in 2020. In 2019, the median home value in Walla Walla County was $231,500. In 2019, the median home value in Walla Walla County was $216,400. In 2019, there were 5,568 units with a home value less than $300,000 in Walla Walla County. This includes 485 units with a value less than $100,000. In 2019, the median monthly rent in Walla Walla County was $926 (U.S. Census Bureau 2020b, 2021a).
- **Yakima County**: An estimated total of 4,622 units were vacant in Yakima County in 2020. In 2019, the median home value in Yakima County was $183,800. In 2019, there were 25,589 units with a home value less than $300,000 in Yakima County. This includes 3,399 units with a value less than $100,000. In 2019, the median monthly rent in Yakima County was $825 (U.S. Census Bureau 2020b, 2021a).

As presented in **Table 3.16-9**, the number of housing units has increased statewide and in Benton, Franklin, Walla Walla, and Yakima Counties from 2011 through 2021. By percent of total housing units, the counties of Walla Walla and Yakima experienced smaller gains in housing than Benton and Franklin Counties over this same period. Housing in Benton and Franklin Counties increased with net gains of approximately 11,647 units and 5,371 units, respectively. Within the Tri-Cities, the City of Pasco experienced the largest absolute increase over this period, with an additional 5,574 units. Similarly, Richland added approximately 4,673 housing units, while Kennewick added an estimated 3,923 units (OFM n.d.[f]).

Table 3.16-9: Number of Housing Units in the Study Area

Geographic Area	Total Housing Units 2011	Total Housing Units 2021	Percent Change	Annual Growth Rate
Benton County	69,739	81,386	16.7 %	1.7 %
Benton City	1,241	1,403	13.1 %	1.3 %
Kennewick	28,745	32,668	13.6 %	1.4 %
Prosser	2,134	2,375	11.3 %	1.1 %
Richland	21,232	25,905	22.0 %	2.2 %
West Richland	4,606	6,104	32.5 %	3.3 %
Franklin County	25,070	30,441	21.4 %	2.1 %
Connell	931	1,031	10.7 %	1.1 %
Kahlotus	113	67	**-40.7 %**	**-4.1 %**
Mesa	128	120	**-6.3 %**	**-0.6 %**
Pasco	19,350	24,924	28.8 %	2.9 %
Walla Walla County	23,537	25,079	6.6 %	0.7 %
Yakima County	85,940	91,292	6.2 %	0.6 %
State of Washington	2,904,623	3,248,747	11.8 %	1.2 %

Source: OFM n.d.(f)
Notes: Postcensal data for each calendar year between the census and the current year are updated annually using information on the components of population change.
Bold = Loss of available housing

Temporary Housing

Table 3.16-10 summarizes the rental housing market for the study area. Viewed by county, these estimates suggest that rental housing is available throughout the study area. The U.S. Census Bureau's American Community Survey 2019 5-Year data indicates rental vacancy rates for the study area counties ranged from 2.7 percent in Franklin County to 6.1 percent in Walla Walla County. Vacancy rates within the Tri-Cities ranged from 2.3 percent in Pasco, Washington to 6.6 percent in Richland, Washington (U.S. Census Bureau 2020b).

Table 3.16-10: Rental Market Conditions for Study Area Counties

Geographic Area	Total Housing Units	Occupied and Paying Rent	Rental Vacancy Rates (%)	Units Available for Rent[(a)]	Seasonal, Recreational, or Occasional Use
Benton County	76,241	21,360	5.1	1660[(b)]	378[(b)]
Benton City	Not Available	Not Available	Not Available	Not Available	Not Available
Kennewick	31,093	10,363	5.2	539	Not Available
Prosser	2,635	930	0.0	0	Not Available
Richland	23,582	7,415	6.6	489	Not Available
West Richland	4,931	724	0.0	0	Not Available
Franklin County	28,063	8,021	2.7	217	Not Available
Connell	1,208	478	3.2	15	Not Available
Kahlotus	Not Available	Not Available	Not Available	Not Available	Not Available
Mesa	Not Available	Not Available	Not Available	Not Available	Not Available
Pasco	22,736	6,561	2.3	151	Not Available
Walla Walla County	24,745	7,645	6.1	466	Not Available
Yakima County	88,698	28,647	2.8	793[(b)]	1,431[(b)]
State of Washington	3,106,528	1,014,639	3.6	49,286[(b)]	91,657[(b)]

Source: U.S. Census Bureau 2020b
Notes:
(a) Housing units for seasonal, recreational, or occasional use are generally considered to be vacation homes. They are not included in the estimated number of housing units available for rent.
(b) 2019 American Community Survey 1-Year Estimate
Not Available = Data not included in the 2019 American Community Survey 5-Year Estimate

Within the study area, temporary housing is also available in the form of hotel and motel rooms. Data compiled by travel research firm STR Global identified 44 hotels in the Tri-Cities area in November 2017, with a total of 4,063 guestrooms (ECONorthwest 2018). STR Global compiles data for commercial lodging establishments with at least 15 rooms. STR Global does not count single-room occupancy hotels, most bed and breakfast inns, or short-term rentals (e.g., Airbnb) (Horse Heaven Wind Farm, LLC 2021).

ECONorthwest in 2018 predicted that the number of guestrooms in the Tri-Cities is expected to increase to about 4,700 in ensuing years. The Tri-Cities short-term rental market is seasonal, with monthly occupancy rates ranging from 42 percent in December to 77 percent in June. Occupancy in July and August averaged 69 percent (Horse Heaven Wind Farm, LLC 2021). Additionally, ECONorthwest states that the Tri-Cities attract a larger than average share of business and meeting visitors, which tends to support higher occupancy in the spring and fall (ECONorthwest 2018).

In addition to short-term rentals, temporary accommodations in the study area also include recreational vehicle (RV) parks and campsites. Within Benton and Franklin Counties, there are 12 RV parks and campgrounds, with a total of 1,320 RV spaces (Horse Heaven Wind Farm, LLC 2021).

3.16.1.9 Schools

Table 3.16-11 summarizes school district, enrolment, and teacher data for the school districts within the study area. Student/teacher ratios, calculated by dividing the total number of students by the total number of full-time equivalent teachers, is a common measure used to assess the overall quality of a school. The statewide average ratio in Washington was 18.4 for the 2019 through 2020 school year. The national student/teacher ratio for the 2019 through 2020 school year was 15.9. The average student/teacher ratios for the study area counties were less than the state ratio and ranged from 12.4 in Walla Walla County to 17.6 in Franklin County (NCES 2022a).

Table 3.16-11: School Districts within the Project Vicinity

Study Area County	School District	Total Number of Schools	Total Number of Students	Number of FTE Teachers	Student/ Teacher Ratio
Benton	Finley School District	3	875	49.60	17.64
Benton	Kennewick School District	32	18,396	1,048.09	17.55
Benton	Kiona-Benton City School District	4	1,385	78.28	17.69
Benton	Paterson School District	1	138	9.90	13.94
Benton	Prosser School District	6	2,540	137.25	18.51
Benton	Richland School District	21	13,596	695.51	19.55
Franklin	Educational Service District 123	2	82	2.00	41.00
Franklin	Kahlotus School District	1	37	9.67	3.83
Franklin	North Franklin School District	9	2,064	116.71	17.68
Franklin	Pasco School District	28	18,614	1,024.26	18.17
Franklin	Star School District No. 054	1	15	2.00	7.50
Walla Walla	College Place School District	4	1,610	92.72	17.36
Walla Walla	Columbia (Walla Walla) School District	3	734	43.71	16.79
Walla Walla	Prescott School District	3	253	18.42	13.74
Walla Walla	Touchet School District	1	212	19.40	10.93
Walla Walla	Waitsburg School District	3	263	17.07	15.41
Yakima	East Valley School District	5	3,172	178.26	17.79
Yakima	Grandview School District	7	3,635	192.28	18.90
Yakima	Granger School District	3	1,449	88.48	16.38
Yakima	Highland School District	5	1,103	61.47	17.94
Yakima	Mabton School District	3	836	50.05	16.70
Yakima	Mount Adams School District	3	857	53.27	16.09
Yakima	Naches Valley School District	4	1,220	74.09	16.47
Yakima	Selah School District	10	3,694	218.38	16.92
Yakima	Sunnyside School District	9	6,712	364.56	18.41
Yakima	Toppenish School District	9	4,450	197.30	22.55
Yakima	Union Gap School District	1	568	35.43	16.03
Yakima	Wapato School District	8	3,279	196.44	16.69

Table 3.16-11: School Districts within the Project Vicinity

Study Area County	School District	Total Number of Schools	Total Number of Students	Number of FTE Teachers	Student/ Teacher Ratio
Yakima	West Valley School District	16	5,313	264.23	20.11
Yakima	Yakima School District	29	15,858	873.56	18.15
Yakima	Zillah School District	4	1,274	72.02	17.6

Source: NCES 2022b
Note: District Details (2020–2021 school year; fiscal data from 2017–2018)
FTE = full-time equivalent

This Page Intentionally Left Blank

4.0 CHAPTER 4 – ANALYSIS OF POTENTIAL IMPACTS AND MITIGATION

4.1 Introduction

This chapter presents the analysis of environmental impacts of the proposed Horse Heaven Wind Farm (Project, or Proposed Action) concerning the elements of the environment identified in Chapter 3 and identifies any required measures for mitigating those impacts.

Three stages would occur if the Project were authorized:

- Construction (including pre-construction)
- Operation
- Decommissioning

Components of the Proposed Action include one of two proposed turbine options (Turbine Option 1 or Turbine Option 2), up to three solar arrays, up to four substations, up to three battery energy storage systems (BESSs),[1] and supporting infrastructure (roads, collector lines, transmission lines, etc.). The final number of turbines (no more than 244) and solar arrays would depend on the turbine models and solar modules selected and the final array layout.

Impacts are analyzed for each component during each of the three Project stages. The analysis is largely based on information provided in the Project's Application for Site Certification (ASC). Potential impacts related to the Project's components are generalized for the analysis of the Proposed Action when impacts are common within the Wind Energy Micrositing Corridor or Solar Siting Areas. The analysis of impacts is based on the laws and regulations current at the moment in time the ASC was submitted to the Washington Energy Facility Site Evaluation Council (EFSEC). Laws and regulations may be different at the time of decommissioning, and there is no way to anticipate if or how laws and regulations may change. EFSEC may request that additional studies be completed as a form of mitigation prior to decommissioning of the Project.

The Project may be built using a "phased approach," with distinct, fully functional portions of the Project potentially being built and implemented sequentially. Table 2-6 provides Horse Heaven Wind Farm, LLC's (Applicant's) example of a phased construction approach that is considered in the analysis of air, transportation, and socioeconomics in Chapters 3 and 4. For all other elements of the environment analyzed in this Draft Environmental Impact Statement (EIS), the Project as a whole (reflecting the potential for all components to be built irrespective of the Applicant's phased construction approach) was analyzed.

4.1.1 Impacts

This chapter includes analyses of the environmental impacts that could occur if the Project were to be built, operated, and maintained for up to 35 years, and eventually decommissioned at the end of that lifespan. This timeframe is based on the ASC; however, the Project has the potential to operate longer if re-powered. This chapter also describes the potential environmental impacts associated with the No Action Alternative.

[1] The Applicant indicated in the ASC that there is the potential for fewer than three BESSs to be constructed but has requested analysis for all the components and distinct parts as presented in Table 2.1-1 of the ASC.

"Impacts" are the effects or consequences of actions (Washington Administrative Code [WAC] 197-11-752) upon the environmental resources listed in Chapter 3. Two types of environmental impacts are described in this chapter:

- *Direct impacts* are the effects of an action (i.e., construction, operation and maintenance, or decommissioning) on a resource that occurs at the same time and place as the action. An example of a direct impact would be increased noise levels experienced by residents living near a construction site.
- *Indirect impacts* are similar to direct impacts in that they are caused by an action; however, they occur later in time or occur farther from the activity causing the impact. An example of an indirect impact would be a decline in numbers of a wildlife species due to fragmentation of that species' habitat by installation of fencing.

A third type of environmental impact, *cumulative impact*, occurs as a result of incremental direct and indirect impacts on resources from a project or plan, past and present actions, and other reasonably foreseeable developments (RFDs). Chapter 5 Cumulative Impacts of this Draft EIS presents an analysis of cumulative impacts.

In accordance with the Washington State Environmental Policy Act (SEPA), this Draft EIS weighs the likelihood of occurrence with the severity of an impact (WAC 197-11-794) and considers several factors when analyzing potential impacts. Factors included in the analysis and rating of impacts are described in **Table 4.1-1**.

Table 4.1-1: Impact Ratings Considered in the Analysis of Potential Impacts

Factor	Rating →			
Magnitude[(a)]	**Negligible** indistinguishable from the background	**Low** small impact, non-sensitive receptor(s)	**Medium** intermediate impact, may occur on sensitive receptor(s) or affect public health and safety	**High** large impact on sensitive receptor(s) or affecting public health and safety
Duration	**Temporary** infrequently during any stage	**Short Term** duration of construction or site restoration	**Long Term** during operation or operation plus another stage of Project	**Constant** during life of Project and/or beyond the Project
Likelihood	**Unlikely** not expected to occur	**Feasible** may occur	**Probable** expected to occur	**Unavoidable** inevitable
Spatial Extent/Setting	**Limited** small area of Lease Boundary or beyond Lease Boundary if duration is temporary	**Confined** within Lease Boundary	**Local** beyond Lease Boundary to neighboring receptors	**Regional** beyond neighboring receptors

Note:
[a] Magnitude ratings are further characterized and specific to each element of the environment in this chapter.

This Draft EIS presents analysis of impacts for each of the three Project stages (construction, operation, and decommissioning) on the elements of the environment identified in Chapter 3. The direct and indirect impacts associated with the Proposed Action and under the No Action Alternative are described quantitatively in this Draft EIS if sufficient data or information were provided in the ASC or subsequent data requests to do so. When detailed information was not available, and that information was not essential to determining the level of adverse environmental impacts, impacts are described qualitatively. For the decommissioning stage, which would occur over 35 years in the future, the exact impacts cannot be determined with certainty as conditions may change; for example, if more of the area is converted to residential use, then the impacts on land use could be different. The analysis uses the best available information to predict the significance of decommissioning-related impacts and uses the word “anticipate” to indicate that these are predictions rather than certainties. As mentioned above, EFSEC may request that additional studies be completed as a form of mitigation prior to decommissioning of the Project.

Impacts that are “similar” in nature but not exactly the same and are rated with the same magnitude, duration, likelihood, and spatial extent may be described as “similar” in this Draft EIS. For example, impacts on wastewater during decommissioning of turbines under Turbine Option 1 would be similar to those described for construction of Turbine Option 1. The impact characterization presented herein considers the Applicant-committed measures and best management practices proposed in the ASC. The Applicant-committed measures and best management practices are intended to avoid or reduce potential impacts. Some Applicant-committed measures may be existing requirements in rule or law. Chapter 2 presents a list of the Applicant-committed measures.

A table (Summary of Potential Impacts) at the end of each resource section summarizes the adverse environmental impacts of the project as detailed in the preceding text. The magnitude ratings of negligible or low on their own do not indicate significant adverse environmental impacts. The magnitude ratings of medium or high indicate the potential for significant adverse environmental impacts and warrant identification of additional mitigation to reduce the impact.

This Draft EIS does not always recommend additional mitigation measures to further reduce impacts that are characterized as either medium or high magnitude. For those impacts, the Applicant commitment is the most effective means of addressing adverse impacts to the affected resource. Furthermore, recommending additional measures would not be helpful in reducing impacts beyond what the Applicant commitment would address. However, the medium or high rating is the magnitude of the impact that would remain.

The impact discussion is organized by various individual components (e.g., Turbine Option 1, Turbine Option 2, solar arrays). It also includes the comprehensive Project, which is the main consideration for understanding the impacts of the total proposal. This additional information about individual components can identify which, if any, components are contributing to a medium or high impact and will assist in further examination of possible options to mitigate the impact of those components and, ultimately, reduce the impact of the comprehensive proposal.

4.1.2 Mitigation

Mitigation measures can be implemented to avoid or reduce impacts associated with the construction, operation and maintenance, and decommissioning of the Project. According to SEPA (WAC 197-11-768), “mitigation” means the following:

- Avoiding the impact altogether by not taking a certain action or parts of an action

- Minimizing impact by limiting the degree or magnitude of the action and its implementation, by using appropriate technology, or by taking affirmative steps to avoid or reduce impacts
- Rectifying the impact by repairing, rehabilitating, or restoring the affected environment
- Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action
- Compensating for the impact by replacing, enhancing, or providing substitute resources or environments
- Monitoring the impact and taking appropriate corrective measures

Mitigation is identified in the Draft EIS, after considering the application of existing laws and rules and all applicant-identified commitments to the Project. In Chapter 4, it is referred to as “Recommended Mitigation.” These mitigation measures may be imposed by EFSEC pursuant to their authority under Revised Code of Washington 80.50 or through the use of their SEPA “substantive authority,” which provides the ability to condition or deny a proposal based on environmental impacts (WAC 197-11-660). Mitigation decisions are at the discretion of EFSEC. These may include, but not be limited to, mitigation identified in the EIS, other mitigation identified outside the EIS, or mitigation identified during adjudication.

The development of mitigation is ongoing during the SEPA process and can even continue after that process is completed. That allows for mitigation to evolve and be refined as more information is collected during the whole EIS process, including the public comment period. Mitigation that may be applied to a project, should it be approved, does not have to be finalized during the SEPA process (e.g., development of mitigation by a Technical Advisory Committee formed for an approved project, or EFSEC imposed mitigation that is identified during adjudication). However, any mitigation that is applied to a project using SEPA substantive authority must meet the requirements of WAC 197-11-660 Substantive authority and mitigation. One requirement of WAC 197-11-660, section (1)(b), states: “Mitigation measures shall be related to specific adverse environmental impacts clearly identified in an environmental document on the proposal and shall be stated in writing by the decision maker.” In this case, the environmental document is the Final EIS and the decisionmaker is EFSEC. Therefore, it is very important for the Final EIS to identify all the impacts of the proposal.

4.2 Earth Resources

This section assesses potential impacts on earth resources within the Lease Boundary of the proposed Horse Heaven Wind Farm (Project, or Proposed Action) and Project vicinity. Additionally, this section evaluates the potential for geologic hazards originating within the Lease Boundary, Project vicinity, and Pacific Northwest region to impact the Project. The Project vicinity includes the areas 4 miles south/southwest of the City of Kennewick, Washington, and the larger Tri-Cities urban area along the Columbia River. The affected environment for earth resources is presented in Section 3.2.

The qualitative evaluation presented herein relies on the impact scale defined in Section 4.1 and shown in **Table 4.2-1** and acreage impacts presented in Section 2.0. Potential impacts are assessed for geology, soils, topography, and geologic hazards during Project construction, operation, and decommissioning.

Due to the Pacific Northwest's active geology, this section analyzes potential impacts on Project components from earthquakes, volcanic activity, landslides, tsunamis, and seiches.

Table 4.2-1: Impact Rating Table for Earth Resources from Section 4.1

Factor	Rating →			
Magnitude	**Negligible** indistinguishable from the background	**Low** small impact, non-sensitive receptor(s)	**Medium** intermediate impact, may occur on sensitive receptor(s) or affect public health and safety	**High** large impact on sensitive receptor(s) or affecting public health and safety
Duration	**Temporary** infrequently during any stage	**Short Term** duration of construction or site restoration	**Long Term** during operation or operation plus another stage of Project	**Constant** during life of Project and/or beyond the Project
Likelihood	**Unlikely** not expected to occur	**Feasible** may occur	**Probable** expected to occur	**Unavoidable** inevitable
Spatial Extent/Setting	**Limited** small area of Lease Boundary or beyond Lease Boundary if duration is temporary	**Confined** within Lease Boundary	**Local** beyond Lease Boundary to neighboring receptors	**Regional** beyond neighboring receptors

As identified in **Table 4.2-2**, the determination of impact magnitude is based on impacts on the nature and type of earth resources, impacts on earth resources, and compliance with state and county requirements.

Table 4.2-2: Criteria for Assessing Magnitude of Impacts on Earth Resources

Magnitude of Impacts	Description
Negligible	**Landscape character:** Landscape would appear unaltered. **Safety:** No change to existing.
Low	**Landscape character:** Landscape would be noticeably altered by changes to the surface of the earth but would not affect the structural integrity of the facilities. **Safety**: No anticipated change to existing.
Medium	**Landscape character:** Landscape would appear considerably altered and may affect the structural integrity of the facilities. **Safety**: A potential geologic hazard could result in an injury to an individual.
High	**Landscape character:** Landscape would appear severely altered and would affect the structural integrity of the facilities. **Safety**: A potential geologic hazard would result in a fatality to an individual.

4.2.1 Method of Analysis

For the assessment of impacts on earth resources from Project development, as well as impacts on the Project from geologic hazards, this section analyzes and compares the following documentation:

- Regulatory requirements and applicable codes and standards
- Horse Heaven Wind Farm, LLC's (Applicant) preliminary geotechnical study of the Lease Boundary (Horse Heaven Wind Farm, LLC 2021)
- Geomorphological and geological characteristics of the Lease Boundary, Project vicinity, and Pacific Northwest (provided in Section 3.2)
- Benton County Natural Hazard Mitigation Plan (Benton County 2019)

4.2.1.1 Regulatory Requirements and Applicable Codes and Standards

The State of Washington Water Pollution Control Act requires compliance with the National Pollutant Discharge Elimination System (NPDES) through a Construction Stormwater General Permit. The NPDES Construction General Permit would require that the Applicant prepare a Stormwater Pollution Prevention Plan that specifies the activities and conditions at the site that could cause water pollution and the steps the contractor must take to prevent the discharge of any unpermitted pollution.

The State of Washington has adopted the 2018 International Building Code (IBC) standards with statewide amendments, effective February 1, 2021. The 2018 IBC provides design-level seismic parameters consistent with the requirements of the American Society of Civil Engineers Standard 7-16 for Minimum Design Loads and Associated Criteria for Buildings and Other Structures. The seismic design parameters are dependent on the structural requirements based on occupancy. The Project would include structures with occupancy categories between I and IV.[2] The Applicant has identified seismic design parameters consistent with the Washington State building code (Horse Heaven Wind Farm, LLC 2021).

The Applicant's Application for Site Certification (ASC) indicates that a final site-specific geotechnical analysis would be reported in a subsequent geotechnical engineering report and geotechnical engineering risk assessment that meets the Benton County Critical Area requirements outlined in Benton County Code (BCC) 15.12.040 and 15.12.050. The Applicant's ASC states that the geotechnical risk assessment would be prepared by a qualified professional meeting the standards specified in BCC 15.02.070(57) (Horse Heaven Wind Farm, LLC 2021) per Washington Administrative Code 463-62-020.

4.2.1.2 Preliminary Geotechnical Study

The Applicant's preliminary geotechnical investigation included the following elements:

- Geotechnical drilling with standard penetration testing at 17 locations within the Wind Energy Micrositing Corridor
- Retrieval of 16 soil borings from potential wind turbine locations that were advanced to a target depth of 60 feet below ground surface (bgs)
- Retrieval of one soil boring from a representative substation site that was advanced to a target depth of 50 feet bgs
- Collection of soil samples from the 17 boring locations for laboratory testing

When a boring could not be advanced beyond 30 feet bgs due to hard ground conditions, the Applicant's team cored rock to depths of 5 to 20 feet below the depth of refusal. According to the preliminary geotechnical investigation report submitted with the ASC, rock coring was performed at two proposed wind turbine locations (Horse Heaven Wind Farm, LLC 2021).

4.2.1.3 Project Comparison to Existing County Natural Hazard Mitigation Planning Goals and Objectives

Table 4.2-3 presents a comparison of the Project with the relevant goals of the Benton County Natural Hazard Mitigation Plan.

[2] Each building and structure shall be assigned a structural occupancy category in accordance with the 2018 IBC. Category I represents buildings and other structures that represent a low hazard to human life in the event of failure; Category II represents building and other structures except those listed in Categories I, III, and IV; Category III represents buildings and other structures that represent a substantial hazard to human life in the event of failure; and Category IV represents buildings and other structures designed as essential facilities.

Table 4.2-3: Project Comparison with the Local Hazardous Area Program's Mitigation Goals and Objectives

Goal/Policy	Project Comparison
Goal 6: Local governments support hazard mitigation planning and support the implementation of the mitigation action items for their jurisdiction.	It is anticipated that the Project would be consistent with this hazard mitigation goal as the ASC states that final geotechnical analyses would be used to calculate the bearing capacity of the soils, conduct stability analyses, and provide engineering recommendations for construction of the structures in accordance with applicable state codes and standards.
Goal 6 Objective E: Support the location of new facilities outside of areas vulnerable to the impacts of natural hazards.	It is anticipated that the Project would be consistent with this hazard mitigation goal and objective as the ASC states that infrastructure would be sited to avoid steep slopes and areas of susceptible soils.
Goal 6 Objective F: Design facilities to withstand the impacts of a disaster when it is not feasible to relocate them.	It is anticipated that the Project would be consistent with this hazard mitigation goal and objective as the Applicant has committed to performing a geotechnical engineering risk assessment meeting the Benton County Critical Area requirements outlined in BCC 15.12.040 and 15.12.050 prior to construction.

Source: Benton County 2019
ASC = Application for Site Certification; BCC = Benton County Code; NPDES = National Pollutant Discharge Elimination System

4.2.2 Impacts of Proposed Action

The following sections assess potential impacts on earth resources, and impacts from geohazards, for each of the Project's components and the whole of the Project for each stage of the Project. Impacts on earth resources from construction, operation, and decommissioning could increase soil erosion or alter topography, and impacts from geological hazards on the Project's components could adversely affect the Project's viability.

Indirect impacts would not be anticipated because the Project is not expected to substantially induce regional growth to an extent that would significantly change off-site geology and soil resources or increase the likelihood that a geologic hazard event would occur.

4.2.2.1 Impacts on Earth Resources during Construction

The Project would permanently impact up to 6,869 acres and temporarily impact up to 2,957 additional acres,[3] during construction. Impacts on earth resources would be anticipated throughout the construction stage, due to altering or removing bedrock, causing soil erosion and compaction, and changing the topography within the Lease Boundary. The following are examples of construction activities that may impact earth resources:

- **Site Mobilization:** The movement of personal vehicles, work trucks, and heavy equipment to and from the Lease Boundary has the potential to track soil off site and increase soil compaction on site.
- **Clearing and Grubbing:** Clearing and grubbing soil and vegetation could lead to soil erosion as the substrate becomes exposed to wind and stormwater runoff. Additionally, clearing and grubbing cold cause soil compaction and changes to surface drainage patterns as infiltration rates decrease.
- **Earthwork:** Impacts on soils and topography would occur as the Project achieves the appropriate grades and subsurface conditions for the construction and installation of access roads, foundations, and temporary crane

[3] Overlapping permanent disturbance area is subtracted from temporary impact corridors/areas.

pads. Earthwork can lead to soil compaction, changes in surface drainage patterns, and fugitive dust as the soil becomes exposed to wind and stormwater runoff, and infiltration rates can decrease, causing a potential increase in localized erosion. The erosion impacts detailed in this section do not include natural erosion processes and are specifically related to impacts from the Project.

- **Installation of Foundations:** The installation of support pilings in bedrock, or other foundation construction techniques, may impact geology. For instance, if basalt is encountered, its removal would impact geological resources.

Turbine Option 1

Impacts on geology from the construction of turbines under Turbine Option 1 would be low, constant, probable, and limited to the specific turbine construction footprint. Specifically, adverse impacts on geology would occur from installing Turbine Option 1's deep foundations. The turbine foundation depths are expected to be between 9 and 12 feet bgs. The Applicant's preliminary geotechnical investigation study encountered basalt bedrock at six boring locations within the Lease Boundary between 5 and 45 feet bgs. At boring WTG-235, the Applicant encountered basalt at less than 5 feet bgs. Due to the potential for shallow bedrock to be present within the Lease Boundary, construction activities could impact geological resources. However, the basalt is expected to be at a sufficient depth that it is unlikely to be encountered during the installation of turbine foundations.

The severity of geology (bedrock) impact during construction is anticipated to be low because subsurface construction activities would rarely[4] be expected to encounter bedrock. If construction activities do encounter bedrock, the impacts, although constant, would be limited to the area of a specific wind turbine or building foundation. When construction workers encounter bedrock, the highly weathered basalt near the top of the rock surface is expected to be mechanically excavated. Blasting of bedrock may be required if less weathered basalt is encountered at shallow depths.

Impacts on soils resources from the construction of turbines under Turbine Option 1 would be low, short term, unavoidable, and confined within the Lease Boundary. These activities would likely include site clearing, excavation, and backfilling. The construction and erection of turbine tower foundations would disturb soil resources as the contractor excavates unsuitable material from the Project area. The disturbance to natural soil profiles could result in a temporary increase in soil erosion.

Impacts on topography from construction of turbines under Turbine Option 1 would be low, short term, unavoidable, and confined within the Lease Boundary. Construction activities that would impact topography include excavation, grading, and cut-and-fill-slope development. Limited grading and/or placement of additional fill may be needed to obtain necessary grades for access roads, building foundations, and leveling the ground. Surface disturbance from construction-related activities would impact topography around each turbine.

Turbine Option 2

Although slight decreases in the amount of disturbance to geology (bedrock), soil, and topography would be expected, as fewer turbines would be constructed under Turbine Option 2, construction-related impacts on earth resources under this option would be similar to those discussed for Turbine Option 1: low, constant, probable, and limited to the footprint of the turbines.

[4] One in 17 borings encountered bedrock during preliminary geotechnical investigations (Westwood Professional Services 2020).

Solar Arrays

The impact on geology during solar array construction is anticipated to be low, constant, feasible, and limited to the footprint of disturbance. Impacts on soil and topography from the construction of solar arrays would be similar to those discussed for construction of turbines under Turbine Option 1 except that subsurface construction activities could encounter bedrock.

Battery Energy Storage Systems

Impacts on soils and topography from the construction of the battery energy storage systems (BESS) would be similar to those discussed for solar arrays: low, short term, unavoidable, and confined. Encountering bedrock is not expected; therefore, impacts on geology from the construction of BESS are low, constant, unlikely, and limited from the construction of the BESS.

Substations

Impacts on geology, soils, and topography from the construction of the substation(s) would be similar to those discussed for BESSs: low, constant, unlikely, and limited to the disturbance footprint of the substations.

Comprehensive Project

Impacts on geology, soils, and topography from construction of the Project as a whole are anticipated to be similar to those discussed for construction of turbines under Turbine Option 1: low, constant, probable, and limited to the footprint of disturbance for the Project.

4.2.2.2 Impacts on Earth Resources during Operations

The Project's operation stage would be associated with facility operations and maintenance. While most earthwork and subsurface foundation work would be completed during the construction stage, additional fill or aggregate materials may be needed to repair roads and underground utilities during the operation stage. The surface topography of the site would not be altered after the construction of the Project is complete.

Turbine Option 1

Operational activities associated with the Project include maintenance of the wind farm infrastructure and ongoing use of access roads and cleared areas. Impacts on geological resources under Turbine Option 1 operations would be negligible, temporary, feasible, and limited to the maintenance area. During operational procedures, impacts on the underlying basalt bedrock would be negligible because maintenance activities are not expected to include deep excavations that encounter geologic resources.

Operations under Turbine Option 1 would result in a low, temporary, feasible, limited impact on soil resources. It is anticipated that no new ground disturbance would occur during the Project's operation stage. During the operation stage, access roads and cleared areas could be susceptible to increased soil erosion from a lack of stabilizing vegetation or hard cover and prior disturbance of the local soil profile. Project operations would have a negligible impact on soil erosion because operations would be limited to gravel-surfaced areas, including the apron constructed around each turbine.

Operations under Turbine Option 1 would result in a negligible, temporary, unlikely, limited impact on the topography within the Lease Boundary. Impacts on topography during operational stages would be negligible, with an unlikely chance of occurring because facility operation would not require further excavation of existing ground surfaces or additional grading. Furthermore, it is anticipated that ground improvement techniques used during the construction stage would mitigate soils susceptible to erosion by improving their engineering performance and reducing their potential for settlement.

Turbine Option 2

Operations under Turbine Option 2 would result in impacts on geology, soils, and topography similar to those discussed for operation of turbines under Turbine Option 1.

Solar Arrays

Impacts on geology, soils, and topography from operation of the solar arrays would be similar to those discussed for operation of turbines under Turbine Option 1.

Battery Energy Storage Systems

Impacts on geology, soils, and topography from operation of the BESSs would be similar to those discussed for operation of turbines under Turbine Option 1.

Substations

Impacts on geology, soils, and topography from the operation of substations would be similar to those discussed for operation of turbines under Turbine Option 1.

Comprehensive Project

Impacts on geology, soils, and topography from the operation of the Project as a whole would be similar to those discussed for operation of turbines under Turbine Option 1.

4.2.2.3 Impacts on Earth Resources during Decommissioning

The Applicant would decommission the Project following the anticipated Project life of up to 35 years, or a successful re-powering of the Project's components that could extend the length of the operation stage. The removal of aboveground Project infrastructure, and land restoration within the Project footprint, may present temporary or short-term impacts on localized areas within the Lease Boundary.

Turbine Option 1

Impacts on geology from decommissioning of turbines under Turbine Option 1 would be low, temporary, probable, and limited to areas of previous development. The likelihood of a foundation removal encountering bedrock is low. If bedrock were to be impacted during the decommissioning stage, then it would likely have already been encountered during the construction stage.

The Applicant has stated in the ASC that upon decommissioning the Project, underground facilities would be removed to a minimum depth of 3 feet bgs. The severity of the impact on soils from the decommissioning under Turbine Option 1 is anticipated to be low, short term, unavoidable, and limited to areas of previous development. Decommissioning activities associated with the Project could impact and disturb the soil profile due to excavating foundations and utilities, removing unsealed areas, restoring the original ground profile, and rehabilitating vegetation.

Impacts on topography during the decommissioning stage would be low, short term, probable, and limited to areas of previous development as the Applicant restores the original topographic profile.

Turbine Option 2

Although slight decreases in the amount of disturbance to geology (bedrock), soil, and topography would be expected, as fewer turbines would be dismantled under Turbine Option 2, impacts on geology, soils, and topography from decommissioning under this option would be similar to those discussed for Turbine Option 1.

Solar Arrays

Impacts on geology, soils, and topography from the decommissioning of solar arrays would be similar to those discussed for decommissioning of turbines under Turbine Option 1.

Battery Energy Storage Systems

Impacts on geology, soil, and topography from decommissioning of BESS(s) would be similar to those discussed for decommissioning of turbines under Turbine Option 1.

Substations

Impacts on geology, soils, and topography from decommissioning of substations would be similar to those discussed for decommissioning of turbines under Turbine Option 1.

Comprehensive Project

Impacts on geology, soils, and topography from decommissioning of the Project as a whole would be similar to those discussed for decommissioning of turbines under Turbine Option 1.

4.2.2.4 Impacts from Geological Hazards on Construction

Geological hazards may occur from sources within the Project Lease Boundary and regional sources. There are 812 acres of geologically hazardous areas (combined erosion hazard areas and steep slope areas) within the Wind Energy Micrositing Corridor and 627 acres within the Solar Siting Areas (Horse Heaven Wind Farm, LLC 2021). The geologically hazardous areas are associated with erosion hazards and steeply sloped areas.

The ASC for the Project states that the final siting of Project components would be developed to avoid geological hazards. Therefore, no impacts are expected in areas identified as having combined erosion hazards and steep slopes, landslides, or liquefaction. The impacts discussed below are based on information from both site-specific and regional sources. Because the Project vicinity is in eastern Washington and surrounded by land, adverse impacts from tsunamis and seiches are not discussed below.

Turbine Option 1

Earthquakes: The impact of earthquakes on construction of the Project under Turbine Option 1 is anticipated to be negligible, temporary, feasible, and confined to the Lease Boundary. Several mapped fault systems are known to occur within the Project vicinity, and unmapped faults may occur within the Lease Boundary. The Applicant's ASC states that the proposed Wind Energy Micrositing Corridor is not located near known faults, and turbines would not be placed near faults. Accordingly, impacts from surface fault rupture under Turbine Option 1 are negligible because faults have not been mapped within the Lease Boundary, and no historic earthquake epicenters have historically occurred within the Lease Boundary to indicate the existence of a buried or unmapped fault.

Prolonged earthquake-induced ground shaking could cause minor damage to infrastructure if shaking has an intensity and duration that exceeds structural design levels. The severity of potential impacts from ground shaking is low but feasible, as Turbine Option 1 would meet Washington State building codes for seismic design. The hazard of ground shaking is not expected to impact construction because regional earthquakes that result in noticeable ground shaking are rare. Any impacts would be temporary across the Project and confined in their extent.

Liquefaction hazard is considered negligible and unlikely. As shown in Figure 3.2-6, soils susceptible to liquefaction during strong ground shaking are located only within the drainage channels at the base of the valleys between the steep ridges. The Applicant's ASC states that Project components would not be developed in areas with soils susceptible to liquefaction.

Landslide Hazards and Ground Instability: The impact of landslide hazards and ground instability on the construction of turbines under Turbine Option 1 would be low, temporary, unlikely, and limited. The Project site includes areas susceptible to landslides and bluff failures. Existing ground instability, high rainfall rates, and strong earthquake shaking could cause landslides.

There are 812 acres of geologically hazardous areas within the Wind Energy Micrositing Corridor and 627 acres within the Solar Siting Areas (Horse Heaven Wind Farm, LLC 2021). Existing steep and unstable slopes are at the greatest risk of developing landslides. Steep slopes (≥15 percent grade) with a high potential for erosion are located perpendicular to the north and south of the Horse Heaven ridgeline.

As illustrated in Figure 3.2-6, evidence of two landslides has been identified just within the site's northern edge. These deposits are not within the Wind Energy Micrositing Corridor. Additionally, the Applicant's ASC states that Project components would not be located in areas susceptible to landslides and ground instability. The severity of potential impacts from landslides is anticipated to be low because Project facilities would be located to avoid steep slopes and drainage areas.

Volcanic Activity: The impact of volcanic activity on Project construction is anticipated to be negligible, temporary, unlikely, and confined to the Lease Boundary. Impacts on Project construction from volcanic activity are unlikely because of the distance between local volcanic centers and their frequency of occurrence. If a Cascade volcano were to erupt, volcanic ashfall, under favorable wind conditions, could reach the Lease Boundary. Hazards from ashfall to construction activities would include the following:

- Accumulation on structures
- Clogging of electronics, machinery, and filters
- Suspension of abrasive fine particles in air and water
- Accumulation on transportation routes and vegetation

The Cascades Volcano Observatory in western Washington maintains an extensive seismic network to monitor regional volcanoes. In an impending eruption, the observatory would issue widespread warnings. A large eruption resulting in ashfall and ash accumulation would create a temporary impact. It is anticipated that construction would resume once safe conditions allowed construction activities to proceed.

Turbine Option 2

Impacts from earthquakes, landslide hazards, ground instability, and volcanic activity on construction of turbines under Turbine Option 2 would be similar to those discussed for construction of turbines under Turbine Option 1.

Solar Arrays

Impacts from earthquakes, landslide hazards, ground instability, and volcanic activity on construction of the solar arrays would be similar to those discussed for construction of turbines under Turbine Option 1.

Battery Energy Storage Systems

Impacts from earthquakes, landslide hazards, ground instability, and volcanic activity on the construction of the BESS(s) would be similar to those discussed for construction of turbines under Turbine Option 1.

Substations

Impacts from earthquakes, landslide hazards, ground instability, and volcanic activity on the construction of the substations are anticipated to be similar to those discussed for construction of turbines under Turbine Option 1.

Comprehensive Project

Impacts from earthquakes, landslide hazards, ground instability, and volcanic activity on the construction of the Project as a whole would be similar to those discussed for construction of turbines under Turbine Option 1.

4.2.2.5 Impacts from Geohazards on Operations

Turbine Option 1

Earthquakes: The impact of earthquakes on the operation of turbines under Turbine Option 1 is anticipated to be low, temporary, feasible, and confined to the Lease Boundary. Several mapped fault systems are known to occur within the Project vicinity, and unmapped faults may occur within the Lease Boundary. The Applicant's ASC states that the Wind Energy Micrositing Corridor are not located near known faults, and the Applicant would not place turbines near any faults if they are detected by subsequent geotechnical investigations. Because no historic earthquake epicenters are located within the Lease Boundary, the applicable severity determination is low.

Prolonged earthquake ground shaking could cause minor damage to infrastructure if the intensity and duration of the shaking exceed structural design levels. The severity of potential impacts from ground shaking is low but feasible. The hazard of ground shaking is not expected to impact operations as regional earthquakes rarely exhibit noticeable ground shaking. Additionally, the Applicant would construct turbines under Turbine Option 1 in accordance with Washington State building codes that address risks associated with seismicity. Any impacts would be temporary across the Project and confined in extent.

Liquefaction hazard is considered negligible and unlikely. As shown in Figure 3.2-6, soils susceptible to liquefaction during strong ground shaking are located only within the drainage channels at the base of the valleys between the steep ridges. The Applicant's ASC states that Project components would not be developed in areas with soils susceptible to liquefaction.

Landslides Hazards and Ground Instability: The Applicant's ASC states that Project components would not be located in areas susceptible to landslides and ground instability. The impact of landslide hazards and ground instability on the operation of turbines under Turbine Option 1 would be low, temporary, unlikely, and limited to developed areas. Analysis found that the Project site includes areas susceptible to landslides and bluff failures. Existing ground instability, high rainfall rates, and strong earthquake shaking could cause landslides. The severity of potential impacts from landslides is considered low because Project facilities would be located to avoid steep slopes and drainage areas.

Volcanic Activity: The impact of volcanic activity on turbine operations under Turbine Option 1 is anticipated to be negligible, temporary, unlikely, and confined to the Lease Boundary. Impacts of volcanic activity on turbine construction are unlikely because of the distance between local volcanic centers and their frequency of occurrence. If a Cascade volcano were to erupt, volcanic ashfall combined with favorable wind conditions could reach the Lease Boundary. Hazards from ashfall to Project operations would include the following:

- Accumulation on structures
- Clogging of electronics, machinery, and filters
- Suspension of abrasive fine particles in air and water
- Accumulation on transportation routes and vegetation

The Cascades Volcano Observatory in western Washington maintains an extensive seismic network to monitor regional volcanoes. In an impending eruption, the observatory would issue widespread warnings. A large eruption resulting in ashfall and ash accumulation would create a temporary impact, possibly including cessation of operations and additional maintenance activities to restore proper function of equipment. It is anticipated that operations would resume once safe conditions allowed energy production to continue.

Turbine Option 2

Impacts from earthquakes, landslide hazards, ground instability, and volcanic activity on the operation of turbines under Turbine Option 2 would be similar to those discussed for operation of turbines under Turbine Option 1.

Solar Arrays

Impacts from earthquakes, landslide hazards, ground instability, and volcanic activity on the operation of solar arrays during construction, operation, and decommissioning would be low, temporary, unlikely, and confined to the Lease Boundary. These environmental incidents, including ashfall and ash accumulation from volcanic activity, would have the potential to reduce the power generated by individual solar panels as well as damage the solar arrays' other components (GFZ 2017). It is assumed that these impacts would be temporary and that the Applicant would repair the solar panels and other components as soon as safe to do so.

Battery Energy Storage Systems

Impacts from earthquakes, landslide hazards, ground instability, and volcanic activity on the operation of BESS(s) would be similar to those discussed for operation of turbines under Turbine Option 1.

Substations

Impacts from earthquakes, landslide hazards, ground instability, and volcanic activity on the operation of substations would be similar to those discussed for operation of turbines under Turbine Option 1.

Comprehensive Project

Impacts from earthquakes, landslide hazards, ground instability, and volcanic activity during operation of the Project as a whole would be low, temporary, unlikely, and confined to the Lease Boundary.

4.2.2.6 Impacts from Geohazards on Decommissioning

Following the operations stage of the Project, the Applicant would decommission the Project site. The removal of aboveground Project infrastructure, and land restoration within the Project footprint, may present temporary or short-term impacts on localized areas within the Lease Boundary.

Turbine Option 1

Earthquakes: Impacts from earthquakes on the decommissioning of turbines under Turbine Option 1 would be similar to those discussed for the construction of turbines under Turbine Option 1. The impact of earthquakes on the decommissioning of turbines under Turbine Option 1 is anticipated to be negligible, temporary, feasible, and confined to the Lease Boundary.

Landslide Hazards and Ground Instability: Impacts from landslide and ground instability on the decommissioning of turbines under Turbine Option 1 would be similar to those discussed for the construction of turbines under Turbine Option 1. The impact of landslide hazards and ground instability on the decommissioning of turbines under Turbine Option 1 is anticipated to be low, temporary, unlikely, and limited to developed areas.

Volcanic Activity: Impacts from volcanic activity on the decommissioning of turbines under Turbine Option 1 would be similar to those discussed for the construction of turbines under Turbine Option 1. The impact of volcanic activity on turbine construction is anticipated to be negligible, temporary, unlikely, and confined.

Turbine Option 2

Impacts from earthquakes, landslide hazards, ground instability, and volcanic activity on the decommissioning of turbines under Turbine Option 2 would be similar to those discussed for decommissioning of turbines under Turbine Option 1.

Solar Arrays

Impacts from earthquakes, landslide hazards, ground instability, and volcanic activity on the decommissioning of solar arrays would be similar to those discussed for decommissioning of turbines under Turbine Option 1.

Battery Energy Storage Systems

Impacts from earthquakes, landslide hazards, ground instability, and volcanic activity on the decommissioning of BESS(s) would be similar to those discussed for decommissioning of turbines under Turbine Option 1.

Substations

Impacts from earthquakes, landslide hazards, ground instability, and volcanic activity on the decommissioning of substations would be similar to those discussed for decommissioning of turbines under Turbine Option 1.

Comprehensive Project

Impacts from earthquakes, landslide hazards, ground instability, and volcanic activity on the decommissioning of the Project as a whole would be similar to those discussed for decommissioning of turbines under Turbine Option 1.

4.2.2.7 Applicant Commitments and Identified Mitigation

This section describes the measures that would reduce or compensate for impacts related to earth resources from construction, operation, and decommissioning of the Project. These measures would be implemented in addition to compliance with the environmental permits, plans, and authorizations required for the Proposed Action.

The intensity of adverse impacts on earth resources can be minimized or reduced through the implementation of mitigation measures, as described below. The Applicant would be responsible for implementing prescribed mitigation measures during the Project's preconstruction, construction, operation, and decommissioning stages.

Applicant Commitments

The Applicant has identified measures and/or best practices that are designed to prevent or minimize potential impacts on the affected environment for the Project. Measures presented by the Applicant in the ASC (Horse Heaven Wind Farm, LLC 2021) and taken into consideration in the characterization of potential impacts related to earth resources are discussed in Section 2.3 and summarized below.

- A stabilized construction entrance/exit would be installed at locations where construction vehicles would access newly constructed roads and/or disturbed areas from paved roads. The stabilized construction entrance/exits would be inspected and maintained for the duration of the Project's lifespan.
- Clearing, excavation, and grading would be limited to those areas of the Project area absolutely necessary for construction of the Project. Areas outside the construction limits would be marked in the field, and equipment would not be allowed to enter these areas or disturb existing vegetation. To the extent practicable, existing vegetation would be preserved. Where vegetation clearing is necessary, root systems would be conserved if possible.
- Vegetated areas that are disturbed or removed during construction would be restored as nearly as reasonably possible to pre-disturbance conditions.
- Excavated soil and rock from grading would be spread across the site to the natural grade and would be reseeded with native grasses to control erosion by water and wind.
- Silt fencing would be installed throughout the Project as a perimeter control and on the contour downgradient of excavations, the operation and maintenance facilities, and substations.
- Straw wattles would be used to decrease the velocity of sheet flow stormwater to prevent erosion. Wattles would be used along the downgradient edge of access roads adjacent to slopes or sensitive areas.
- Mulch would be used to immediately stabilize areas of soil disturbance, and during reseeding efforts.
- Jute matting, straw matting, or turf reinforcement matting would be used in conjunction with mulching to stabilize steep slopes that were exposed during access road installation.
- Soil binders and tackifiers would be used on exposed slopes to stabilize them until vegetation is established.
- Concrete chutes and trucks would be washed out in dedicated areas near the foundation construction locations. This would prevent concrete washout water from leaving a localized area. Soil excavated for the concrete washout area would be used as backfill for the completed footing to ensure that the surface soils maintain infiltration capacity.
- To facilitate installation of the wind turbine generator (turbine) footings, large excavations would be created. Soil from these excavations would be temporarily stockpiled and used as backfill for the completed footing. Silt fencing would be installed around the stockpile material as a perimeter control. Mulch or plastic sheeting would be used to cover the stockpiled material. Soils would be stockpiled and reused to prevent mixing of productive topsoil with deeper subsoils.
- After construction is completed, the site would be revegetated with an approved seed mix. When required, the seed would be applied in conjunction with mulch and/or stabilization matting to protect the seeds as the grass

establishes. Revegetation would take place as soon as site conditions and weather allow following construction.

- If water crossings are needed, check dams and sediment traps would be used during construction of low-impact ford crossings or culvert installations. The check dams and sediment traps would minimize downstream sedimentation during construction of the stream crossings.
- To the extent practicable, construction activities would be scheduled in the dry season, when soils are less susceptible to compaction. Similarly, soil disturbance should be postponed when soils are excessively wet such as following a precipitation event.
- A Revegetation Plan was prepared by the Applicant (Appendix N, Horse Heaven Wind Farm, LLC 2021). The Revegetation Plan describes methods, success criteria, monitoring, and reporting for revegetation of areas that would be temporarily disturbed during construction of the Project. A summary of key measures presented in the Revegetation Plan is provided below.
  - Following construction, temporarily disturbed areas would be revegetated with native plant species, or non-invasive, non-persistent non-native plant species, as described in the Revegetation and Noxious Weed Management Plan. The plan calls for revegetation of agriculture land to occur in consultation with the landowner. Non-agricultural land would be seeded.
  - The Applicant provided four example seed mixes containing native plants to the area, but the final composition of seed mixes would be determined based on preconstruction conditions and the availability of seed at the time of procurement. Two grassland seed mixes and two shrub-steppe seed mixes are proposed.
  - Modified habitat would be replanted under the solar arrays as described in the Revegetation and Noxious Weed Management Plan. The seed mix identified for the modified habitat includes low-growing grasses and forbs: Sandberg bluegrass (Poa secunda), bottlebrush squirreltail (Elymus elymoides), prairie junegrass (Koeleria macrantha), milkvetch (Astragalus sp.), shaggy fleabane (Erigeron pumilus), and woolly plantain (Plantago patagonica).
  - Revegetation monitoring would be conducted annually for a minimum of three years unless the landowner converted the areas (e.g., to agriculture land). Following annual monitoring, a monitoring report would be prepared that would include recommendations for remedial actions, if any. Monitoring reports would be submitted to the Washington Energy Facility Site Evaluation Council (EFSEC) within 60 days of the annual monitoring inspection.
  - The success criteria identifies trigger points that would require modifications to the Revegetation Plan based on the monitoring reports. For example, should total coverage from seeding not meet the success criteria, the environmental monitor may indicate areas that require additional seeding or soil amendments. Remedial action would be identified where the success criteria are not met by Year 3 (for revegetated grassland habitat) or Year 5 (for revegetated shrub-steppe habitat), which may include reseeding, planting with container plants, additional weed control, and other measures as needed.

Recommended Mitigation Measures

EFSEC has identified the following additional and modified mitigation measures for the Project to avoid and/or minimize potential impacts related to earth resources:

Geo-1[5]: To limit erosion and disturbance of natural soil profiles, soil disturbance would be postponed when soils are excessively wet, such as following a precipitation event.

In addition to the geology mitigation measures the following measures developed for the Vegetation chapter are applicable to geology:

Veg-7[6]: Detailed Site Restoration Plan: A Detailed Site Restoration Plan would be prepared and submitted for approval by EFSEC for final revegetation prior to Project decommissioning for the temporary and permanent disturbance areas, including modified habitat. The Restoration Plan would be a living document. It would include the methods, success criteria, monitoring, and reporting for revegetation at the end of the Project life. It would also include provisions for adaptive management and would be updated based on any lessons learned from implementing the Restoration Plan created for the temporary disturbance from Project construction (Appendix N, Horse Heaven Wind Farm, LLC 2021). This mitigation measure provides specifications on the Detailed Site Restoration Plan for decommissioning.

4.2.2.8 Significant Unavoidable Adverse Impacts

Determining the significance of an impact involves its context and intensity, which, in turn, depend on the magnitude and duration of the impact. “Significant” in the Washington State Environmental Policy Act means a reasonable likelihood of more than a moderate adverse impact on environmental quality. An impact may also be significant if its chance of occurrence is not great, but the resulting environmental impact would be severe if it occurred (Washington Administrative Code 197-11-794).

This Draft Environmental Impact Statement weighs the potential impacts on earth resources that may result from the Proposed Action with mitigation and makes a resulting determination of significance for each impact in **Tables 4.2-4a, 4.2-4b, and 4.2-4c**.

[5] Geo-: Identifier of numbered mitigation item for Geology

[6] Veg-: Identifier of numbered mitigation item for Vegetation, as described in Section 4.5

This Page Intentionally Left Blank

Table 4.2-4a: Summary of Potential Impacts on Earth Resources during Construction of the Proposed Action

Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Geology	Turbine Option 1 Turbine Option 2 **Comprehensive Project**	Adverse impacts on geology would occur from the installation of deep turbine foundations.	Low	Constant	Probable	Limited	No mitigation identified	None identified
Geology	Solar Arrays	Subsurface construction activities would rarely encounter bedrock	Low	Constant	Feasible	Limited	No mitigation identified	None identified
Geology	BESSs Substations	Subsurface construction activities would not be expected to encounter bedrock.	Low	Constant	Unlikely	Limited	No mitigation identified	None identified
Soils	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	The disturbance to natural soil profiles could result in a temporary increase in localized soil erosion. These activities are likely to include site clearing, excavation, and backfilling. The construction and erection of turbine tower foundations would disturb soil resources as the contractor excavates unsuitable material from the Project area.	Low	Short term	Unavoidable	Confined	**Geo-1:** Avoid construction during wet periods **Veg-7:** Detailed Site Restoration Plan	None identified
Topography	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Construction activities that would impact topography include excavation, grading, and cut-and-fill-slope development. Limited grading and/or placement of additional fill may be needed to obtain necessary grades for access roads, building foundations, and leveling the ground. Surface disturbance from construction-related activities would impact topography around each turbine.	Low	Short term	Unavoidable	Confined	**Geo-1:** Avoid construction during wet periods	None identified
Earthquakes	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Prolonged earthquake-induced ground shaking could cause minor damage to infrastructure if shaking has an intensity and duration that exceeds code-based structural seismic design levels.	Negligible	Temporary	Feasible	Confined	**Geo-1:** Avoid construction during wet periods	None identified
Landslide Hazards and Ground Instability	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	The Project site includes areas susceptible to landslides and bluff failures. Existing ground instability, high rainfall rates, and strong earthquake shaking could cause landslides.	Low	Temporary	Unlikely	Limited	**Geo-1:** Avoid construction during wet periods **Veg-7:** Detailed Site Restoration Plan	None identified

Table 4.2-4a: Summary of Potential Impacts on Earth Resources during Construction of the Proposed Action

Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Volcanic Activity	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Hazards from ashfall to construction activities would include the following: ▪ Accumulation of ash on structures ▪ Clogging of electronics, machinery, and filters ▪ Suspension of abrasive fine particles in air and water ▪ Accumulation of ash on transportation routes and vegetation	Negligible	Temporary	Unlikely	Confined	**Geo-1:** Avoid construction during wet periods **Veg-7:** Detailed Site Restoration Plan	None identified

Notes:
[a] The impacts related to each component including "comprehensive Project" were rated separately; components were combined in the same cell if they received the same impact ratings for the identified topic.
[b] Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.
[c] Mitigation measures listed here are additional actions that EFSEC could impose to further reduce the impacts. See Section 4.1 Introduction for details.
[d] Significant unavoidable impacts are those that would remain even after all identified additional mitigation measures have been required by EFSEC.
BESS = Battery energy storage system; EFSEC = Washington Energy Facility Siting Council

Table 4.2-4b: Summary of Potential Impacts on Earth Resources during Operation of the Proposed Action

Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Geology	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Impacts on the underlying basalt bedrock are not expected to include deep excavations that encounter geologic resources.	Negligible	Temporary	Feasible	Limited	No mitigation identified	None identified
Soils	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	It is anticipated that no new ground disturbance would occur. Access roads and cleared areas could be susceptible to increased soil erosion from a lack of stabilizing vegetation or hard cover and prior disturbance of the local soil profile. Soil erosion, because of operations, would be limited to gravel-surfaced areas, including the apron constructed around each turbine.	Low	Temporary	Feasible	Limited	**Veg-7:** Detailed Site Restoration Plan	None identified
Topography	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Facility operation would not require further excavation of existing ground surfaces or additional grading. Furthermore, it is anticipated that ground improvement techniques used during the construction stage would mitigate soils susceptible to erosion by improving their engineering performance and reducing their potential for settlement.	Negligible	Temporary	Unlikely	Limited	No mitigation identified	None identified
Earthquakes	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Prolonged earthquake ground shaking could cause minor damage to infrastructure if the intensity and duration of the shaking exceed code-based structural seismic design levels.	Low	Temporary	Feasible	Confined	No mitigation identified	None identified
Landslide Hazards and Ground Instability	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Existing ground instability, high rainfall rates, and strong earthquake shaking could cause landslides.	Low	Temporary	Feasible	Limited	**Veg-7:** Detailed Site Restoration Plan	None identified

Table 4.2-4b: Summary of Potential Impacts on Earth Resources during Operation of the Proposed Action

Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Volcanic Activity	Turbine Option 1 Turbine Option 2 BESSs Substations	Hazards from ashfall to operational activities would include the following: ▪ Accumulation of ash on structures ▪ Clogging of electronics, machinery, and filters ▪ Suspension of abrasive fine particles in air and water ▪ Accumulation of ash on transportation routes and vegetation	Negligible	Temporary	Unlikely	Confined	**Veg-7:** Detailed Site Restoration Plan	None identified
Volcanic Activity	Solar Arrays **Comprehensive Project**	Ashfall and ash accumulation have the potential to reduce the photovoltaic-generated power of the solar panel as well as damage the solar arrays' components	Low	Temporary	Unlikely	Confined	No mitigation identified	None identified

Notes:
(a) The impacts related to each component including "comprehensive Project" were rated separately; components were combined in the same cell if they received the same impact ratings for the identified topic.
(b) Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.
(c) Mitigation measures listed here are additional actions that EFSEC could impose to further reduce the impacts. See Section 4.1 Introduction for details.
(d) Significant unavoidable impacts are those that would remain even after all identified additional mitigation measures have been required by EFSEC.
BESS = battery energy storage system; EFSEC = Washington Energy Facility Site Evaluation Council

Table 4.2-4c: Summary of Potential Impacts on Earth Resources during Decommissioning of the Proposed Action

Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Geology	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	The likelihood of a foundation removal encountering bedrock is low. If bedrock were to be impacted during the decommissioning stage, then it would likely have already been encountered during the construction stage.	Low	Temporary	Probable	Limited	**Geo-1:** Avoid construction during wet periods **Veg-7**: Detailed Site Restoration Plan	None identified
Soils	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Decommissioning activities associated with the Project could impact and disturb the soil profile, due to excavating foundations and utilities, removing unsealed areas, restoring the original ground profile, and rehabilitating vegetation.	Low	Short Term	Unavoidable	Limited	**Geo-1:** Avoid construction during wet periods **Veg-7**: Detailed Site Restoration Plan	None identified
Topography	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	The Applicant would restore the original topographic profile in areas of previous development.	Low	Short Term	Probable	Limited	**Geo-1:** Avoid construction during wet periods **Veg-7**: Detailed Site Restoration Plan	None identified
Earthquakes	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Prolonged earthquake ground shaking could cause minor damage to infrastructure if the intensity and duration of the shaking exceed structural seismic design levels.	Negligible	Temporary	Feasible	Confined	**Geo-1:** Avoid construction during wet periods **Veg-7**: Detailed Site Restoration Plan	None identified
Landslide Hazards and Ground Instability	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Existing ground instability, high rainfall rates, and strong earthquake shaking could cause landslides.	Low	Temporary	Feasible	Limited	**Geo-1:** Avoid construction during wet periods **Veg-7**: Detailed Site Restoration Plan	None identified

Table 4.2-4c: Summary of Potential Impacts on Earth Resources during Decommissioning of the Proposed Action

Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Volcanic Activity	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Hazards from ashfall to decommissioning activities would include the following: ▪ Accumulation of ash on structures ▪ Clogging of electronics, machinery, and filters ▪ Suspension of abrasive fine particles in air and water ▪ Accumulation of ash on transportation routes and vegetation	Negligible	Temporary	Unlikely	Confined	**Geo-1:** Avoid construction during wet periods **Veg-7**: Detailed Site Restoration Plan	None identified

Notes:
(a) The impacts related to each component including "comprehensive Project" were rated separately; components were combined in the same cell if they received the same impact ratings for the identified topic.
(b) Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.
(c) Mitigation measures listed here are additional actions that EFSEC could impose to further reduce the impacts. See Section 4.1 Introduction for details.
(d) Significant unavoidable impacts are those that would remain even after all identified additional mitigation measures have been required by EFSEC.
BESS = battery energy storage system; EFSEC = Washington Energy Facility Site Evaluation Council

4.2.3 Impacts of No Action Alternative

Under the No Action Alternative, impacts related to earth resources from the construction, operation, and decommissioning of the Proposed Action would not occur. For the purpose of this analysis, it is assumed that no future development would occur within the Lease Boundary.

This Page Intentionally Left Blank

4.3 Air Quality

This section describes the impacts on air quality that could result from the proposed Horse Heaven Wind Farm (Project, or Proposed Action) and under the No Action Alternative. Section 3.3 presents the affected environment for air quality. Potential impacts are assessed within the Lease Boundary and the Project vicinity, which includes the areas 4 miles south/southwest of Kennewick, Washington, and the larger Tri-Cities urban area along the Columbia River.

Under the Washington State Environmental Policy Act, this Draft Environmental Impact Statement (EIS) weighs the likelihood of occurrence with the severity of an impact (Washington Administrative Code [WAC] 197-11-794) and considers several factors when evaluating potential impacts (WAC 197-11-330 and WAC 197-11-794). These impacts were qualitatively assessed based on the method of analysis described in Section 4.3.1. Additionally, the qualitative evaluation presented herein relies on the impact scale defined in Section 4.1 and summarized in **Table 4.3-1**.

Table 4.3-1: Impact Rating Table for Air Quality from Section 4.1

Factor	Rating			
Magnitude	**Negligible** indistinguishable from the background	**Low** small impact, non-sensitive receptor(s)	**Medium** intermediate impact, may occur on sensitive receptor(s) or affect public health and safety	**High** large impact on sensitive receptor(s) or affecting public health and safety
Duration	**Temporary** infrequently during any stage	**Short Term** duration of construction or site restoration	**Long Term** during operation or operation plus another stage of Project	**Constant** during life of Project and/or beyond the Project
Likelihood	**Unlikely** not expected to occur	**Feasible** may occur	**Probable** expected to occur	**Unavoidable** inevitable
Spatial Extent/Setting	**Limited** small area of Lease Boundary or beyond Lease Boundary if duration is temporary	**Confined** within Lease Boundary	**Local** beyond Lease Boundary to neighboring receptors	**Regional** beyond neighboring receptors

As identified in **Table 4.2-2**, the determination of impact magnitude is based on relative quantity of emissions; compatibility with applicable air quality rules, regulations, and plans; and potential exposure to sensitive receptors.[7]

Table 4.3-2: Criteria for Assessing Magnitude of Impacts on Air Resources

Magnitude of Impact	Description
Negligible	**Quantity of Emissions:** Project emissions are extremely small or negligible in comparison to background regional emissions. **Compatibility with Applicable Rules, Regulations, and Plans:** The Project would comply with all applicable rules, regulations, and plans. **Potential Exposure to Sensitive Receptors:** No sensitive receptors are located near the site.
Low	**Quantity of Emissions:** Project emissions are low in comparison to background regional emissions. **Compatibility with Applicable Rules, Regulations, and Plans:** The Project is expected to comply with all applicable rules, regulations, and plans. Additional agency approvals may be required. **Potential Exposure to Sensitive Receptors:** Few sensitive receptors are located in close proximity to the site.
Medium	**Quantity of Emissions:** Project emissions are similar to background regional emissions, or would raise background regional emissions but not to a level that could cause adverse effects on human health **Compatibility with Applicable Rules, Regulations, and Plans:** The Project is expected to comply with all applicable rules, regulations, and plans. Additional agency approvals and mitigation may be required. **Potential Exposure to Sensitive Receptors:** More than a few sensitive receptors are located in close proximity to the site.
High	**Quantity of Emissions:** Project emissions are high in comparison to background regional emissions or would raise background emissions above regional air quality levels that would cause adverse human health effects **Compatibility with Applicable Rules, Regulations, and Plans:** The Project may comply with all applicable rules, regulations, and plans, but some changes to rules, regulations, or plans may be required to establish conformity. Additional agency approvals and mitigation are required. **Potential Exposure to Sensitive Receptors:** Many sensitive receptors are located in close proximity to the site.

Background

Potential impacts from the Proposed Action were assessed for air quality during Project construction, operations and maintenance, and decommissioning. Potential impacts from the construction, operation, and decommissioning of the various Project components, turbines, substations, solar arrays, and battery energy storage systems (BESS) are considered collectively in this assessment. The construction of these components is

[7] Sensitive receptors are locations where particularly vulnerable persons reside for extended periods and include: day care centers, schools, nursing homes, hospitals and other similar facilities.

expected to occur concurrently; the same is true for the operation and decommissioning stages. Accordingly, the air quality impacts during each stage would result collectively from all equipment.

This evaluation includes Project emissions estimates for the construction and operation stages, including construction phasing and traffic estimates, that are presented in the Application for Site Certification (ASC) (Horse Heaven Wind Farm, LLC 2021a). Although not explicitly estimated, decommissioning-stage emissions are expected to be comparable to or less than construction-stage emissions. This assessment of impacts on air quality from Project development is based on the following:

- Construction and operations emission calculations prepared by Horse Heaven Wind Farm, LLC (Applicant) (Horse Heaven Wind Farm, LLC 2021b)
- Supplemental emission calculations for fugitive dust during construction (Appendix 4.3-1)
- Review of background climate, air quality, and regional emissions inventory data

4.3.1 Method of Analysis

For point sources of pollution, such as a stationary facility with emissions from physical stacks, air quality impacts are typically assessed using air quality dispersion computer models approved by the U.S. Environmental Protection Agency (EPA). The computer models are used to predict ambient air quality concentrations resulting from operation of specific point sources. Modeled air quality concentration impacts are added to existing background air quality levels to determine a predicted ambient air quality level (modeled impact from source + background air quality = predicted ambient air quality). This predicted ambient air quality level can be compared with applicable National Ambient Air Quality Standards (NAAQS) to determine whether a proposed source is expected to cause a violation of any NAAQS. Commonly used EPA-approved air quality dispersion models are generally based on:

- Steady-state emissions parameters that do not fluctuate in location, velocity or flow rate, temperature, or emission rate
- Meteorological data sets, generally obtainable from monitoring stations representative of site conditions, that include key parameters affecting dispersion such as wind speed, wind direction, atmospheric stability, and ambient temperature

For the Project, expected emissions would result either from mobile equipment or from fugitive dust from disturbed surfaces that are not steady-state. The anticipated emissions would vary in location, emission rate, and emission release patterns over time. These variations can be addressed by computer dispersion modeling. This dispersion modeling of Project emissions has not been performed for the Draft EIS. However, the Final EIS will provide an updated air quality impact analysis based on computer dispersion modeling of project construction emissions, including a worst-case set of assumptions that captures the Applicant’s desire for flexibility in overlapping construction activities.

Instead of dispersion modeling, expected emissions from the Project were calculated and compared to existing background regional (i.e., countywide) emissions using the most current regional emissions inventory. The Project was evaluated for conformity with applicable rules, regulations, and plans. The Project vicinity was also evaluated for the presence of nearby sensitive receptors. The qualitative rating system described in Section 4.1 was used to assess the extent of air quality impacts according to the following attributes:

- Magnitude – Are quantities of emissions negligible, low, moderate, or high in comparison to existing background regional emissions? Are Project emissions compatible with applicable rules, regulations, and plans, or would additional agency approvals, mitigation or changes to applicable rules, regulations, or plans be needed to establish conformity? Are there sensitive receptors in close proximity that could be exposed to substantial quantities of air pollutants?
- Duration – Are emissions temporary, short term, long term, or constant, and would they continue beyond the life of the Project?
- Spatial Extent – Are emissions impacts confined to a very small area, do they extend throughout the entire Lease Boundary, do they extend beyond the Lease Boundary to nearby receptors, or are they regional in nature?
- Likelihood – Are emissions impacts unlikely, feasible, probable, or inevitable?

Example Phased Approach

This Draft EIS considers the impact of the Project as a whole. To align the impact rating system described by the Applicant's air quality impact analysis in the ASC, this evaluation of air quality analyzes potential impacts from the Proposed Action in the context of the Applicant's example of a phased approach to construction:

- Phase 1 construction could generate power via wind and solar. Phase 1 could also include a BESS capable of storing energy.
- Phase 2 construction is divided into Phase 2a and Phase 2b, summarized as follows:
  - Phase 2a could consist of the construction of both wind and solar facilities. The Applicant's Phase 2a scenario also includes the construction of a BESS.
  - Phase 2b could increase power generation via the construction of additional wind turbines, but construction would not include a BESS.

Chapter 2 contains more information on the Applicant's example of a phased approach to construction. The construction schedule, including phasing of specific elements of the Project, could alter the details of the analysis. Any construction traffic volume increases from combining the two phases are expected to be minimal and unlikely to affect the analysis for the phased approach.

Emissions are reported separately for each example, Phase 2a and Phase 2b. Emissions during construction of Phase 1 and Phase 2 were not anticipated to occur coincidentally or in the same calendar year, according to information supplied by the Applicant. Emission calculations for each phase of the Project were provided by the Applicant in a supplemental data response (Horse Heaven Wind Farm, LLC 2021b) and are presented in **Table 4.3-3**, below. This table presents the total emissions associated with on-road and off-road fuel-burning equipment to be used during construction and operation, as well as estimated fugitive dust emissions during construction by overall Project phase. The Applicant did not provide estimates for emissions during Project decommissioning. It can be assumed that the decommissioning activities would be similar and no more intensive than the construction activities. Accordingly, the associated emissions during decommissioning would be no more than those presented for the construction activities. Emissions are also presented by calendar year during construction and operation of the Project. These emission estimates incorporate Applicant-proposed emission control measures presented in the ASC (Horse Heaven Wind Farm, LLC 2021a).

Calculation details for each Project phase are provided in **Appendix 4.3-1** and include:

- A listing of anticipated air-emitting equipment for each phase
- The assumed equipment ratings, load factors, and references for the emissions factors8
- Other assumptions used in the calculations

The emissions factors used are presented in **Appendix 4.3-1**. This appendix also provides construction schedules for each phase of the Project, as well as the types and quantities of equipment and other assumptions used for each specific task during construction, operation, and maintenance of the Project.

Emissions factors for non-road[9] mobile equipment to be used during construction of the Project were calculated using the current version of the EPA's Motor Vehicle Emission Simulator (MOVES) emissions factor modeling system (EPA 2021a). The current version of MOVES, known as MOVES3, is the EPA's accepted model for estimating mobile source emissions for both federal and state environmental assessments. MOVES analyses were conducted using default input files for Benton County provided by the Washington State Department of Ecology (Ecology) (Horse Heaven, LLC 2021b). The analyses were conducted for two separate calendar years, 2023 and 2024, and were used to estimate emissions from the corresponding phase of construction occurring in each year[10] (Horse Heaven Wind Farm, LLC 2021b).

Emissions for on-road mobile equipment to be used during construction, operation, and maintenance of the Project, including supply trucks, delivery vehicles, and worker commute vehicles, were also calculated using MOVES3 and the default input files for Benton County. The analyses were conducted for calendar years 2023 and 2024 and applied to the corresponding phase of construction occurring in each calendar year. The 2024 emissions factors were also used to estimate on-road vehicle emissions during operation and maintenance activities for calendar years 2025 and later (Horse Heaven Wind Farm, LLC 2021b).

[8] Emissions factors (EFs) are standardized factors developed for calculating emissions from different air pollutant-emitting activities. EFs are generally expressed in mass per unit of activity. Emissions are calculated by multiplying EF x units of activity. For example, motor vehicle EFs are frequently expressed in terms of gm/vehicle mile traveled (VMT). In this case VMT is the unit of activity. Total motor vehicle emissions are then calculated as follows: motor vehicle emissions (grams) = EF (grams/VMT) x VMT. EFs vary by pollutant and source category. In some instances, EFs vary by equipment ratings, load factors and other parameters. More specifics are contained in EPA (2016, 2021a, 2021b).

[9] The term "non-road" applies to any source equipment that is not a motor vehicle routinely operated on a highway or road. Examples of non-road mobile equipment relevant to the Project include graders, scrapers, excavators, trenchers, and many other types of off-highway mobile construction equipment. The term also includes airplanes, trains, ships, and other ocean or water-going vessels. The terms "non-road" and "off-road" are often used synonymously and interchangeably.

[10] 2023 emissions factors were used for Phase 1 construction emissions, and 2024 emissions factors were used for both Phase 2a and Phase 2b construction emissions.

Table 4.3-3: Summary of Air Quality Emissions, tons per year

Emission Totals by Phase[a]	VOCs	NO_X	CO	PM_{10}	$PM_{2.5}$	SO_2	HAP	CO_2	CH_4	N_2O	CO_2e
Phase 1 Wind	3.03	24.66	17.83	1.34	1.29	0.03	0.40	9,094	0.29	0.17	9,150.72
Phase 1 Solar	2.12	14.67	9.94	1.15	1.11	0.02	0.39	4,794	0.16	0.10	4,827.91
Phase 1 Battery	0.27	2.29	1.42	0.12	0.11	0.00	0.03	806	0.03	0.01	811.34
Fugitive Dust	-	-	-	1,163.38	125.22	-	-	-	-	-	-
Phase 1 total	**5.43**	**41.63**	**29.19**	**1,165.99**	**127.73**	**0.05**	**0.82**	**14,695**	**0.48**	**0.28**	**14,789.97**
Phase 2a Wind	3.47	29.48	18.44	1.68	1.62	0.04	0.53	11,199	0.33	0.22	11,272.03
Phase 2a Solar	1.92	13.23	8.75	1.05	1.01	0.01	0.36	4,547	0.15	0.10	4,579.36
Phase 2a Battery	0.25	2.12	1.27	0.11	0.11	0.00	0.03	797	0.03	0.01	802.14
Fugitive Dust	-	-	-	957.79	103.05	-	-	-	-	-	-
Phase 2a total	**5.64**	**44.82**	**28.46**	**960.63**	**105.79**	**0.05**	**0.92**	**16543**	**0.51**	**0.33**	**16,653.53**
Phase 2b Wind	4.27	36.73	22.69	2.04	1.96	0.04	0.64	13,858	0.41	0.27	13,947.13
Fugitive Dust	-	-	-	963.97	109.19	-	-	-	-	-	-
Phase 2b total	**4.27**	**36.73**	**22.69**	**966.01**	**111.15**	**0.04**	**0.64**	**13,858**	**0.41**	**0.27**	**13,947.13**
Operations and Maintenance (O&M)[b]	0.07	0.28	0.62	N	N	N	N	134.31	1.22×10^{-2}	1.00	134.91
O&M total[b]	**0.07**	**0.28**	**0.62**	**N**	**N**	**N**	**N**	**134.31**	**1.22×10^{-2}**	**1.00×10^{-3}**	**134.91**

Table 4.3-3: Summary of Air Quality Emissions, tons per year

Emission Totals by Calendar Year	VOCs	NO_X	CO	PM_{10}	$PM_{2.5}$	SO_2	HAP	CO_2	CH_4	N_2O	CO_2e
2023 (Phase 1)	5.43	41.63	29.19	1165.99	127.73	0.05	0.82	14,694.57	0.48	0.28	14,789.97
2024 (Maximum of Phase 2a or 2b)	5.64	44.82	28.46	966.01	111.15	0.05	0.92	16,543.35	0.51	0.33	16,653.53
2025 and onward (O&M)[b]	0.07	0.28	0.62	N	N	N	N	134.31	1.22×10^{-2}	1.00×10^{-3}	134.91

Source: **Appendix 4.3-1**

Notes:

[a] Emissions from individual phase components wind, solar, and battery include fuel-burning on-road and off-road equipment only. Fugitive dust emissions calculated and reported separately

[b] An N in this row denotes negligible emissions (less than 0.01 tons per year)

"-" = no emissions; CH_4 = methane; CO = carbon monoxide; CO_2 = carbon dioxide; CO_2e = carbon dioxide equivalent; HAP = hazardous air pollutants; N_2O = nitrous oxide; NO_X = oxides of nitrogen; O&M = operations and maintenance; PM_{10} = particulate matter less than 10 microns in diameter; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; SO_2 = sulfur dioxide; VOC = volatile organic compound

For non-road equipment, MOVES3 produced emissions factors for volatile organic compounds (VOCs), oxides of nitrogen (NO_X), carbon monoxide (CO), particulate matter less than 10 microns in diameter (PM_{10}), particulate matter less than 2.5 microns in diameter ($PM_{2.5}$), sulfur dioxide (SO_2), carbon dioxide (CO_2), and methane (CH_4) in units of grams per horsepower-hour. Emissions of nitrous oxide (N_2O) from non-road equipment used a default emissions factor of 0.26 grams of N_2O per gallon of fuel combusted (EPA 2016). Emissions factors for hazardous air pollutant (HAP) compounds from non-road diesel equipment were based on Documentation for Aircraft, Commercial Marine Vessel, Locomotive, and Other Nonroad Components of the National Emissions Inventory, Volume I - Methodology, October 7, 2003 (ERG 2003). Total emissions of greenhouse gases (GHG) (measured in tons of CO_2 equivalents, or CO_2e) were calculated by applying the appropriate global warming potential (GWP) factors from Title 40, Code of Federal Regulations, Part 98 to the estimated emissions of CO_2, CH_4, and N_2O.[11] The GWP factors for these GHGs are 1 for CO_2, 25 for CH_4, and 298 for N_2O.

For on-road vehicles, MOVES3 produced emissions factors for VOCs, NO_X, CO, PM_{10}, $PM_{2.5}$, SO_2, CO_2, CH_4, N_2O, and CO_2e measured in grams per vehicle mile traveled. Emissions factors for HAP compounds from on-road vehicles were not available from the MOVES3 analyses. HAP emissions from on-road vehicles used during construction, operation, and maintenance of the Project are presumed to be negligible based on the relatively small total emissions of other pollutants contributed by Project-related on-road vehicles.

The fugitive dust emissions estimates reported in **Table 4.3-3**, above, include estimated contributions from exposed surface windblown dust, access road traffic, bulldozing activities, and grading activities that are separated, calculated, and presented as a “fugitive dust emissions” sum. Emissions factors were calculated using methods outlined in the EPA’s Compilation of Air Pollutant Emissions Factors (AP-42) (EPA 2021b). This reference has been published since 1972 as the primary compilation of the EPA’s emissions factor information. It contains emissions factors and process information for more than 200 air pollution source categories. A source category is a specific industry sector or group of similar emitting sources. The emissions factors have been developed and compiled from source test data, material balance studies, and engineering estimates. Since the 1995 fifth edition, the EPA has published many supplements and updates, the entirety of which are available online. **Appendix 4.3-1** includes further details regarding the specific equations and assumptions that were used in this analysis. Traffic count, mileage, exposed acreage, and duration were all derived from information reported in the ASC (Horse Heaven Wind Farm, LLC 2021a) or the associated data responses (Horse Heaven Wind Farm, LLC 2021b.)

4.3.2 Impacts of Proposed Action

4.3.2.1 Impacts during Construction

During construction, Project impacts would result from use of fuel-burning equipment to support construction, as well as fugitive dust associated with exposed surface windblown dust, access road traffic, bulldozing, and grading activities. For each phase of the Project, these emissions are compared with the countywide emissions, as shown in **Table 4.3-3**. These emission estimates incorporate Applicant-proposed emission control measures presented in the ASC (Horse Heaven Wind Farm, LLC 2021a).

[11] GWP is a factor that relates the global warming potential of each substance to the mass of CO_2 that would create the equivalent amount of global warming. For example, CH_4 has 25 times the global warming potential of CO_2 and therefore has a GWP of 25. Since each GHG has its own unique GWP, standard convention is to multiply the mass emissions of each GHG by its respective GWP to determine and report total CO_2e from all GHG emissions rather than report the emission rates of GHGs with different GWPs separately.

It should be noted that each Project phase includes several subcomponents—wind turbines, solar arrays, BESSs, and associated substations. For the wind turbine portion of the Project, the Applicant is considering two wind turbine options. The information provided by the Applicant does not allow a detailed examination of the difference between Turbine Option 1 and Turbine Option 2. However, it is expected that air quality impacts would be similar for both options. **Table 4.3-3**, above, provides a breakdown of combustion equipment emissions for each of the Project subcomponents. It is not possible to provide a similar breakdown for fugitive emissions based on information contained in the ASC. Based on the relative emissions for each subcomponent, the largest contributor to overall construction emissions would be the wind turbines, followed by the solar array, followed by the BESS. However, since all subcomponents of the Project are expected to be constructed more or less concurrently, this analysis compares the totality of the Project's emissions to regional emissions. Emissions associated with each phase of construction differ slightly in amount but are of comparable magnitude in relation to emissions in the county (**Table 4.3-4**).

Table 4.3-4: Comparison of Project Construction Emissions to Countywide Emissions by Phase

Category	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_2	VOCs	CO_2e
Annual Countywide Emissions (tons per year)[(a)]	29,463	5622	14,493	3,190	105.5	11,548	1.1×10^8 [(b)]
Phase 1 (tons per year)	29.19	41.63	1,165.99	127.73	0.82	5.43	147,89.97
% of County Annual Emissions	0.10%	0.74%	8.05%	4.00%	0.78%	0.05%	0.01%
Phase 2a (tons per year)	28.46	44.82	960.63	105.79	0.05	5.64	16,653.53
% of County Annual Emissions	0.10%	0.80%	6.63%	3.32%	0.05%	0.05%	0.02%
Phase 2b (tons per year)	22.69	36.73	966.01	111.15	0.04	4.27	13,947.13
% of County Annual Emissions	0.08%	0.65%	6.67%	3.48%	0.04%	0.04%	0.01%

Sources: Ecology 2020, n.d.; **Table 4.3-3**

Notes:

(a) Annual countywide emissions are for the year 2017 (the most recent year for which Ecology has published countywide)

(b) Ecology reported greenhouse gas emissions in CO_2e of 99.6 million metric tons for 2018 (the most recent year for which data are available) which is equivalent to 1.1×10^8 tons.

CO = carbon monoxide; CO_2e = carbon dioxide equivalent; Ecology = Washington State Department of Ecology; NO_X = oxides of nitrogen; PM_{10} = particulate matter less than 10 microns in diameter; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; SO_2 = sulfur dioxide; VOC = volatile organic compound

Emissions during Project construction are expected to comply with all applicable air quality rules, regulations, and plans. The Applicant has indicated the possible use of a concrete batch plant and backup diesel generators to support the commissioning process but has not provided specific plans or details regarding these potential sources because it is not certain that they will be needed. If either a concrete batch plant or backup diesel generators are ultimately included in the Project, supplemental environmental analysis would be required, and the Applicant would be required to submit applications to the Washington Energy Facility Site Evaluation Council (EFSEC) for approval of these sources prior to implementation. In addition, the Applicant would be required to submit a supplemental air quality assessment demonstrating compliance with applicable ambient air quality standards, as well as Benton Clean Air Agency (BCAA), Ecology, and EPA regulations. BCAA, serving as contractor to EFSEC (not as the permit-issuing agency), would likely review these applications and advise EFSEC regarding conformance with applicable air quality plans, policies, and regulations, as well as any recommended mitigation measures prior to receiving approval from EFSEC to include these additional Project components.

The results presented in **Table 4.3-4** are discussed in the context of the impact rating system as follows:

- **Magnitude** – Quantities of emissions of CO, NOX, SO2, and VOCs, as well as GHG emissions (CO2e), are considered negligible in the context of regional emissions, given that the expected emissions of each pollutant are less than 1 percent of regional emissions. Emissions of PM10 and PM2.5, on the other hand, would exceed 5 and 1 percent, respectively, of regional emissions and would be considered low. The Project's estimated emissions are expected to comply with all applicable rules, regulations, and plans. No sensitive receptors are located in close proximity to the Project. As a result, the Project is expected to have a low-magnitude air quality impact during construction.
- **Duration** – Construction emissions would occur only during construction and are considered short term. Once the construction period ends, emissions for all pollutants drop to negligible quantities, as noted in Section 4.3.2.2 below. Since ambient air quality for CO, NOX, and SO2 are well below applicable NAAQS, short-term emissions are small in comparison to regional emissions, they are unlikely to contribute to levels that would result in a violation of an applicable NAAQS. Ozone, PM10, and PM2.5 ambient levels have less margin relative to the NAAQS and are therefore discussed further below with respect to duration.
  - **Ozone –** The area has exhibited periodic short-term (1-hour average) ozone levels above 70 parts per billion (ppb) in recent years, but there are no 1-hour ozone NAAQS. There have been no exceedances of the 8-hour average ozone NAAQS, but the area is currently considered unclassifiable.[12] Ozone tends to build up during high ambient temperatures (greater than 85 degrees Fahrenheit) and low to moderate (less than 6 mile-per-hour) north to northeast winds, conditions that are infrequent based on the wind rose shown in Section 3.3 (WSU 2017). These conditions are expected to persist for only a limited portion of the construction period. Ozone would not be not directly emitted by the Project, but rather potentially formed in the atmosphere over time from emissions of other precursor pollutants (predominantly NO_X and VOCs). As noted in the discussion of emissions quantities, above, ozone precursor emissions reflect a very small portion (less than 1 percent) of area-wide emissions and are therefore unlikely to contribute measurably to lasting, elevated ozone levels that would jeopardize attainment status.
  - **PM_{10} and $PM_{2.5}$** – The nearest ambient air quality monitor experienced high PM_{10} in 2019, but these periods have been associated with extreme events (wildfires). This drove the three-year average above the NAAQS, but concentrations dropped in 2020 and the area continues to be considered in attainment. Twenty-four-hour average $PM_{2.5}$ levels at the nearest monitor have been observed to be above the standard in recent years, but, when considered in the context of data collected at other regional monitors, continues to result in the area being considered in attainment.[13] Emissions during construction would be temporary and not continuous. The Applicant has proposed a number of PM_{10} and $PM_{2.5}$ emissions

[12] An EPA designation of "attainment" signifies that the EPA has formally determined that ambient air quality in an area complies with the applicable NAAQS, meaning that ambient air quality is better than the standards established to protect public health and welfare. Conversely, an EPA designation of "nonattainment" signifies that the EPA has formally determined that ambient air quality in an area fails to meet the applicable NAAQS. Areas that are designated "unclassifiable" do not possess sufficient air quality data to support a formal designation. Benton County is designated "unclassifiable/attainment" for the 2008 8-hour ozone standard and "unclassifiable" for the lower 2015 8-hour ozone standard because there are insufficient monitoring data to support a formal "attainment" or "nonattainment" designation.

[13] Benton County PM_{10} and $PM_{2.5}$ ambient air quality is considered "in attainment" because the majority of ambient air quality data from the nearest air quality monitors (excepting poor air quality events associated with extreme wildfires events that have been excluded by EPA) are better than the applicable NAAQS. The area has been formally designated "attainment/unclassifiable" meaning it is considered in attainment with the NAAQS but is "unclassifiable" because there are insufficient monitoring data to support a formal "attainment" designation.

controls that would further reduce already low emissions. As a result of the short duration and temporary nature of Project construction emissions, and the control measures proposed by the Applicant, these emissions are not expected to result in a noticeable change in the area's ambient air quality or attainment status.

- **Likelihood** – The Applicant has committed to a variety of best management practices (BMPs) that would minimize the occurrence of dust, including periodically applying water to stabilize exposed surfaces and limiting vehicle speed to reduce surface disturbance. These BMPs should adequately control fugitive dust in most instances, but, under very high winds, some temporary fugitive dust emissions would be feasible. Emissions associated with PM10 and PM2.5 are considered probable.
- **Spatial Extent** – Construction-related gaseous emissions from combustion would largely impact areas within the Lease Boundary. Temporary visible fugitive dust tends to fall out rapidly and within a few 100 meters of the source. It consists primarily of particles that are larger than PM10 that do not influence regional air quality. However, PM10 and PM2.5 components of fugitive dust (not generally visible to the naked eye) could remain suspended in the air for greater distances. Fugitive dust emissions are generally temporary or short-term events that do not usually persist at a sustained rate over extended periods of time, such as a full 24-hour period, the shortest averaging time for which ambient air quality standards have been established. Over a 24-hour period PM10 and PM2.5 emissions would likely be dispersed rapidly with distance from the source such that average ambient air quality impacts over a full 24-hour period at nearby residential receptors would be considered confined. All other air pollutant impacts are considered confined.

Based on the above, impacts are considered low, short-term, probable, and limited to confined.

4.3.2.2 Impacts during Operation

During operation, the Project would have air quality impacts associated primarily with the use of air conditioning equipment (minor GHG emissions only), maintenance vehicles, and fugitive dust that could occur from the use of access roads. These emissions are summarized in **Table 4.3-5** in comparison to countywide emissions and incorporate Applicant-proposed emission control measures presented in the ASC (Horse Heaven Wind Farm, LLC 2021a). Emissions of each pollutant are extremely small, representing much less than 0.01 percent of regional emissions.

Table 4.3-5: Comparison of Project Operations and Maintenance Emissions and Countywide Emissions

Category	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_2	VOCs	CO_2e
Countywide Emissions (tons per year)[(a)]	29,463	5,622	14,493	3,190	105.5	11,548	1.1E x 10^8 [(b)]
Project O&M (tons per year)	0.62	0.28	9.43E-03	8.65E-04	5.46E-04	7.00E-02	135
% of County Annual Emissions	0.002%	0.005%	0.0001%	0.00003%	0.001%	0.001%	0.0001%

Sources: Ecology 2020, 2021; Horse Heaven Wind Farm, LLC 2021b
Notes:
(a) Countywide emissions are for the year 2017 (the most recent year for which Ecology has published countywide)
(b) Ecology reported greenhouse gas emissions in CO_2e of 99.6 million metric tons for 2018 (the most recent year for which data are available) which is equivalent to 1.1 x 10^8 tons.
CO = carbon monoxide; CO_2e = carbon dioxide equivalent; Ecology = Washington State Department of Ecology; NO_X = oxides of nitrogen; O&M = operations and maintenance; PM_{10} = particulate matter less than 10 microns in diameter; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; SO_2 = sulfur dioxide; VOC = volatile organic compound

The results presented in **Table 4.3-5** are discussed in the context of the adopted impact rating system below:

- **Magnitude** – All air pollutant emissions combined would account for less than 0.01 percent of regional emissions, would be indistinguishable from background activities at these levels, and are considered negligible. The Project's estimated emissions are expected to comply with all applicable rules, regulations, and plans. No sensitive receptors are located in close proximity to the Project. As a result, the Project would be expected to have a negligible magnitude air quality impact during operation.
- **Duration** – Emissions would occur throughout the operation stage of the Project and would persist throughout the operation stage but would be short term in nature in that they would occur only when maintenance vehicles are in use. Although the area has experienced brief periods of high PM10, these periods have been associated with extreme events (wildfires) that are not expected to jeopardize attainment status. Similarly, PM2.5 ambient air quality has been observed in multiple years above the 24-hour NAAQS at the nearest monitor, but when viewed in the context of other available regional monitoring, the area continues to be considered in attainment. Emissions during operations would be short term and not continuous. They would not be expected to result in a noticeable change in the area's ambient air quality or attainment status.
- **Likelihood** – The Applicant has committed to a variety of BMPs. These BMPs should adequately control fugitive dust in most instances, but under very high winds, some temporary fugitive dust emissions would be feasible.
- **Spatial Extent** – Gaseous emissions from combustion of fuel in maintenance vehicles would be limited to access roads within the Lease Boundary.

Based on the above, impacts are considered negligible, short term, probable, and limited.

4.3.2.3 Impacts during Decommissioning

Due to the limited information available regarding decommissioning activities for the Project, emission rates during this period are not specifically calculated. The primary sources of emissions during decommissioning would be the transportation of workers and material to and from the site, use of off-road construction equipment to dismantle and remove foundations and equipment, and some surface disturbance (not as extensive as the grading activity required for construction) to support revegetation. It can therefore be expected that impacts from emissions would be somewhat less than those calculated for construction, but greater than those calculated for operation and incorporate Applicant-proposed emission control measures presented in the ASC (Horse Heaven Wind Farm, LLC 2021a).

Based on the above, impacts during decommissioning are expected to be low, short term, probable, and limited to confined.

4.3.2.4 Applicant Commitments and Identified Mitigation

This section describes the measures that would reduce or compensate for impacts related to air quality from construction, operation, and decommissioning of the Project. These measures would be implemented in addition to compliance with the environmental permits, plans, and authorizations required for the Proposed Action.

The Applicant has committed in the ASC (Horse Heaven Wind Farm, LLC 2021a) to a number of measures that would reduce overall impacts on ambient air quality during construction and decommissioning. Additional mitigation measures are proposed, as described below.

Applicant Commitments

The Applicant has identified measures and/or best practices that are designed to prevent or minimize potential impacts on the affected environment for the Project. Measures presented by the Applicant in the ASC (Horse Heaven Wind Farm, LLC 2021a) and taken into consideration in the characterization of potential impacts on air quality are discussed in Section 2.3 and summarized below.

- Construction and operations vehicles and equipment would comply with applicable state and federal emissions standards.
- Vehicles and equipment used during construction would be properly maintained to minimize exhaust emissions. Construction equipment that meets the EPA's Tier 4 emission standards for diesel engines would be used to the extent it is available (Horse Heaven Wind Farm, LLC 2021b).
- Operational measures such as limiting engine idling time and shutting down equipment when not in use would be implemented.
- Watering or other fugitive dust abatement measures would be used as needed to control fugitive dust generated during construction.
- Construction materials that could be a source of fugitive dust would be covered when stored.
- Traffic speeds on unpaved roads would be limited to 25 mph to minimize generation of fugitive dust.
- Truck beds would be covered when transporting dirt or soil.
- Construction workers would be encouraged to carpool to minimize construction-related traffic and associated emissions.
- Erosion-control measures would be implemented to limit deposition of silt to roadways and to minimize a vector for fugitive dust.
- Replanting or graveling disturbed areas would be conducted during and after construction to reduce windblown dust.

Recommended Mitigation Measures

EFSEC has identified the following additional and modified mitigation measures for the Project to avoid and/or minimize potential impacts on air quality:

A-1[14]: Limit traffic speeds on unpaved areas to less than 15 mph[15], rather than the Applicant-proposed 25-mph limit. Access-road-related fugitive dust from construction vehicle traffic is the single largest source of PM_{10} and $PM_{2.5}$ emissions from Project construction. Road-related fugitive dust emissions increases with increasing vehicle speed. Consequently, one of the best management practices for mitigation of road-related fugitive dust emissions is to limit vehicle speed. The Applicant has proposed to limit vehicle speed to 25 mph. A lower vehicle speed limit of 15 mph is feasible and would further reduce fugitive PM_{10} and $PM_{2.5}$ emissions.

[14] A-: Identifier of numbered mitigation item for Air

[15] A speed limit of 15 mph is commonly required to reduce emissions from construction of California energy projects.

4.3.2.5 Significant Unavoidable Adverse Impacts

Determining the significance of an impact involves context and intensity, which, in turn, depend on the magnitude and duration of an impact. “Significant” in the Washington State Environmental Policy Act means a reasonable likelihood of more than a moderate adverse impact on environmental quality. An impact may also be significant if its chance of occurrence is not great, but the resulting environmental impact would be severe if it occurred (WAC 197-11-794).

This Draft EIS weighs the impacts on air quality that may result from the Proposed Action with mitigation and makes a resulting determination of significance for each impact in **Tables 4.3-6a, 4.3-6b, and 4.3-6c**.

Table 4.3-6a: Summary of Potential Impacts on Air Resources during Construction of the Proposed Action

Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Air Quality	**Comprehensive Project**	Adverse impacts on air quality may occur during construction from $PM_{2.5}$, PM_{10}, and fugitive dust	Low	Short Term	Probable	Confined	**A-1:** Limit speeds to less than 15 mph on dirt roads.	None identified

Notes:
(a) Impacts evaluated for the comprehensive Project since emissions from individual components within each phase will occur concurrently.
(b) Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.
(c) Mitigation measures listed here are additional actions that EFSEC could impose to further reduce the impacts. See Section 4.1 Introduction for details.
(d) Significant unavoidable impacts are those that would remain even after all identified additional mitigation measures have been required by EFSEC.
EFSEC = Energy Facility Site Evaluation Council; mph = miles per hour; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than 10 microns in diameter

Table 4.3-6b: Summary of Potential Impacts on Air Resources during Operation of the Proposed Action

Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Air Quality	**Comprehensive Project**	Adverse impacts on air quality may result from operation and maintenance activities (primarily vehicular emissions)	Negligible	Short Term	Probable	Confined	**A-1:** Limit speeds to less than 15 mph on dirt roads.	None identified

Notes:
(a) Impacts evaluated for the comprehensive Project since emissions from individual components within each phase will occur concurrently.
(b) Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.
(c) Mitigation measures listed here are additional actions that EFSEC could impose to further reduce the impacts. See Section 4.1 Introduction for details.
(d) Significant unavoidable impacts are those that would remain even after all identified additional mitigation measures have been required by EFSEC.
EFSEC = Washington Energy Facility Site Evaluation Council; mph = miles per hour

Table 4.3-6c: Summary of Potential Impacts on Air Resources during Decommissioning of the Proposed Action

Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Air Quality	**Comprehensive Project**	Adverse impacts on air quality may occur during decommissioning from $PM_{2.5}$, PM_{10}, and fugitive dust	Low	Short Term	Probable	Confined	**A-1:** Limit speeds to less than 15 mph on dirt roads.	None identified

Notes:
(a) Impacts evaluated for the comprehensive Project since emissions from individual components within each phase will occur concurrently
(b) Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.
(c) Mitigation measures listed here are additional actions that EFSEC could impose to further reduce the impacts. See Section 4.1 Introduction for details.
(d) Significant unavoidable impacts are those that would remain even after all identified additional mitigation measures have been required by EFSEC.
EFSEC = Washington Energy Facility Site Evaluation Council; mph = miles per hour; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than 10 microns in diameter

4.3.3 Impacts of No Action Alternative

Under the No Action Alternative, impacts related to air quality from the construction, operation, and decommissioning of the Proposed Action would not occur. For the purpose of this analysis, it is assumed that no future development would occur within the Lease Boundary.

This Page Intentionally Left Blank

4.4 Water Resources

This section describes the potential impacts on water resources, identified in Section 3.4, that could result from the construction, operation, and decommissioning of the proposed Horse Heaven Wind Farm (Project, or Proposed Action), as well as from the No Action Alternative. This evaluation addresses the following water resources:

- Surface water and wetlands
- Runoff and absorption
- Floodplains
- Groundwater
- Public water supply

The qualitative evaluation presented herein relies on the impact scale defined in Section 4.1 and shown in **Table 4.4-1**.

Table 4.4-1: Impact Rating Table for Water Resources from Section 4.1

Factor	Rating →			
Magnitude	**Negligible** indistinguishable from the background	**Low** small impact, non-sensitive receptor(s)	**Medium** intermediate impact, may occur on sensitive receptor(s) or affect public health and safety	**High** large impact on sensitive receptor(s) or affecting public health and safety
Duration	**Temporary** infrequently during any stage	**Short Term** duration of construction or site restoration	**Long Term** during operation or operation plus another stage of Project	**Constant** during life of Project and/or beyond the Project
Likelihood	**Unlikely** not expected to occur	**Feasible** may occur	**Probable** expected to occur	**Unavoidable** inevitable
Spatial Extent/Setting	**Limited** small area of Lease Boundary or beyond Lease Boundary if duration is temporary	**Confined** within Lease Boundary	**Local** beyond Lease Boundary to neighboring receptors	**Regional** beyond neighboring receptors

As identified in **Table 4.4-2**, the determination of impact magnitude is based on the Project's anticipated impacts on water resources, including impacts on surface water and wetlands, floodplains, groundwater, and public water supply. Impacts are quantified, where available, to assess their magnitude. Where impacts are not quantifiable, the magnitude of impact is determined based on change relative to existing conditions. The identified ratings have been included to further define magnitude in each case.

The magnitude of impacts for runoff and absorption was determined qualitatively using information on changes to impervious surfaces, mitigation measures, and the anticipated flow control of mitigation measures based on best management practices (BMPs) (Ecology 2019).

Table 4.4-2: Criteria for Assessing Magnitude of Impacts on Water Resources

Magnitude of Impacts	Description
Negligible	The Project would avoid impacts on water resources. Impacts on water resources would be indistinguishable from existing conditions.
Low	The Project would have minor temporary and/or permanent impacts on water resources. This may be a minor increase in impervious surfaces or temporary work within ephemeral streams. Impacts would be distinguishable from current conditions but are not anticipated to affect ecological function of water resources or public water supply.
Medium	The Project would have moderate impacts on water resources from temporary and permanent disturbance. Ecological functions of water resources are anticipated to be largely maintained, but may be compromised at certain points during the year.
High	The Project would have major impacts on water resources and result in permanent alterations. Water resources would be greatly altered from the current condition, and ecological functions provided by water resources are anticipated to be lost or degraded.

4.4.1 Method of Analysis

The impacts on water resources from Project components and activities are assessed for the construction, operation, and decommissioning stages within the Lease Boundary.

Laws and regulations for determining potential impacts on water resources are summarized in **Table 4.4-3**.

Table 4.4-3: Laws and Regulations for Water Resources

Regulation, Statute, Guideline	Responsible Authority	Description
Federal		
Endangered Species Act of 1973	U.S. Fish and Wildlife Service	▪ Protects endangered and threatened species (including subspecies, varieties, and subpopulations) listed under the act and protects the ecosystems on which they rely.
Clean Water Act (CWA)	U.S. Army Corps of Engineers	▪ Establishes regulations for discharging pollutants into waters of the United States and regulates water quality standards for surface water. Under the CWA, it is unlawful to release pollutants into navigable waters unless a permit is obtained. ▪ The Joint Aquatic Resource Permit Application (JARPA) joint submittal is used by the Washington State Departments of Fish and Wildlife, Ecology, Natural Resources (for state-owned aquatic land), and Transportation; U.S. Environmental Protection Agency; U.S. Army Corps of Engineers; U.S. Coast Guard; and local governments (for shorelines). The JARPA provides a consolidated permit application process for federal, state, and local permits for construction and development activities near aquatic environments, including the local Shoreline Permit, State 401 Water Quality Certification, State Hydraulic Project Approval, State Aquatic Use Authorization, State Mooring Buoy Applications, Federal Section 404 and Section 10, Federal Private Aids to Navigation, and Federal 401 Water Quality Protection Agency. ▪ Section 404 of the CWA provides authorization for the discharge of dredge or fill material into waters of the United States, including wetlands. ▪ Section 401 of the CWA provides states and tribes the authority to issue water quality certifications, which are required for federal discharge permits into waters of the United States. ▪ Section 402 of the CWA regulates point sources of discharge for pollutants to waters of the United States. A National Pollutant Discharge Elimination System permit is required for a facility to discharge a specified amount of pollutant into receiving waters under certain conditions. The permit is submitted to Ecology as the delegated authority for the state.
State		
Revised Code of Washington (RCW) Chapter 90.48 Water Pollution Control	Washington State Department of Ecology (Ecology)	▪ The policy aims to maintain the highest standard for waters of the state to preserve public health and recreation and to protect wildlife and aquatic species. It prohibits the discharge of pollution to state waters. "Pollution" is defined as any physical, chemical, or biological property that could impact the ecological function. ▪ An Administrative Order under RCW 90.48 could be required to authorize discharges into waters of the state. Mitigation would be required. ▪ A Sand and Gravel General Permit would be required for potential stormwater discharges associated with rock crushing and concrete batch plants if required on site within the Project Lease Boundary.

Table 4.4-3: Laws and Regulations for Water Resources

Regulation, Statute, Guideline	Responsible Authority	Description
RCW 77.55 Construction Projects in State Waters	Washington Department of Fish and Wildlife (WDFW)	▪ Under the Hydraulics Act, a Hydraulics Project Approval permit submitted to WDFW would be required when stormwater discharges related to a project would change natural flow or bed of state waters.
Washington Administrative Code (WAC) 463-62-060 Construction and Operation Standards for Energy Facilities – Water Quality	Energy Facility Site Evaluation Council (EFSEC)	The Water Quality standards state: ▪ "Waste water discharges from projects under the council's jurisdiction shall meet the requirements of applicable state water quality standards, chapter 173-201A WAC, state groundwater quality standards, chapter 173-200 WAC, state sediment management standards, chapter 173-204A WAC, requirements of the Federal Water Pollution Control Act as amended (86 Stat 816,33 U.S.C. 1251, et seq.) and regulations promulgated thereunder."
Washington Administrative Code (WAC) 463-60-332 Natural Environment – Habitat, vegetation, fish and wildlife	EFSEC	Application for site certification will include: ▪ An assessment of the existing habitats and their use, with a description of the habitats and species present on and adjacent to the site, relative cover, distribution, health, and vigor; the identification of any species of local importance, priority species, or endangered, threatened, or candidate species; and a discussion of management recommendations. ▪ Identification of the energy facility impacts, including temporary, permanent, direct, and indirect impacts on water quality, stream hydrology, in-stream flow, habitat, species, and their use of habitat. This shall include impacts due to the impacts on and changes to species communities adjacent to the project site, and an assessment of the potential for impacts from hazardous or toxic material.
State of Washington Priority Habitat and Species List (WDFW 2008)	WDFW	▪ WDFW maintains a catalog of priority habitat and species that are a priority for conservation and management. Priority species are those that require protection due to population trends, sensitivity to disturbance, and habitat alteration, or are important to communities. Priority habitats are unique habits or features that support biodiversity and include freshwater wetlands.
WDFW Wind Power Guidelines (WDFW 2009)	WDFW	▪ The purpose of the WDFW Wind Power Guidelines is to provide guidance for the development of wind energy facilities that avoid, minimize, and mitigate impacts on fish and wildlife habitat. WDFW provides review and recommendations to the permitting authority based on environmental expertise. Freshwater wetlands are a priority habitat.
WAC 173-201A Water Quality Standards for Surface Waters of the State of Washington	Ecology	▪ Establishes surface water quality standards for State of Washington surface waters that are consistent with public health standards, recreational use, and the protection of fish and wildlife. Surface waters include lakes, rivers, streams, ponds, wetlands, inland waters, and saltwater.

Table 4.4-3: Laws and Regulations for Water Resources

Regulation, Statute, Guideline	Responsible Authority	Description
WAC 170-303 Dangerous Waste Regulations	Ecology	▪ The purposes of this regulation are to (Ecology 2020): (1) Designate those solid wastes which are dangerous or extremely hazardous to the public health and environment; (2) Provide for surveillance and monitoring of dangerous and extremely hazardous wastes until they are detoxified, reclaimed, neutralized, or disposed of safely; (3) Provide the form and rules necessary to establish a system for manifesting, tracking, reporting, monitoring, recordkeeping, sampling, and labeling dangerous and extremely hazardous wastes; (4) Establish the siting, design, operation, closure, post-closure, financial, and monitoring requirements for dangerous and extremely hazardous waste transfer, treatment, storage, and disposal facilities; (5) Establish design, operation, and monitoring requirements for managing the state's extremely hazardous waste disposal facility; (6) Establish and administer a program for permitting dangerous and extremely hazardous waste management facilities; and (7) Encourage recycling, reuse, reclamation, and recovery to the maximum extent possible. ▪ Dangerous waste would be stored a minimum of 0.25 miles from any surface water intake for domestic water. ▪ Fuels, oils, and any other hazardous substance would be stored within secondary containment. Secondary containment requires placing tanks or containers within an impervious structure that is capable of containing 110 percent of the volume contained in the largest tank within the containment structure.
Growth Management Act (GMA)	Ecology	▪ Protection of Critical Aquifer Recharge Areas (CARA) is required under the GMA. CARAs are defined as “areas with a critical recharging effect on aquifers used for potable water” (Ecology 2005). CARAs are established to protect drinking water supply by preventing pollution from entering groundwater and maintaining access to groundwater supply. ▪ The GMA also identifies wetlands and fish and wildlife habitat such as stream corridors as critical areas.
Local		
Benton County Code (BCC) – Chapter 15.02 General Provisions	Benton County	▪ BCC 15.02 designates and classifies ecologically sensitive and hazardous areas and provides protection to these areas. ▪ Critical areas include the following: aquifer recharge areas, fish and wildlife conservation areas, frequently flooded areas, geologically hazardous areas, and wetlands.

Table 4.4-3: Laws and Regulations for Water Resources

Regulation, Statute, Guideline	Responsible Authority	Description
BCC 15.04 Wetlands	Benton County	▪ All areas that meet the definition of a wetland in the Federal Wetlands Delineation Manual (i.e., are inundated or saturated with surface or groundwater to support hydrophytic vegetation) are designated critical areas. ▪ Wetlands will be rated according to Ecology's Washington State Wetland Rating System for Eastern Washington – Revised. Only activities related to conservation and enhancement are allowed in wetlands without submission of a critical area report. ▪ Wetlands are rated in accordance with Ecology's Washington State Wetland Rating System for Eastern Washington (Hruby 2014), and establishes the required buffers. Standard buffer widths for wetlands are as follows: ▪ 75 to 190 feet for Category I wetlands, depending on habitat points and the type of wetland. ▪ 75 to 150 feet for Category II wetlands, depending on habitat points and type of wetland. ▪ 60 to 150 feet for Category III wetlands depending on habitat points. ▪ 40 feet for Category IV wetlands.
BCC 15.06 Aquifer Recharge Areas	Benton County	▪ CARAs are areas that have a critical recharging effect on aquifers used for potable water. ▪ These include floodplains and floodways, areas of high ground water, areas with Hydrologic A soils, areas with designated wellhead protection, areas within 100 feet of all irrigation district main canals, and areas with alluvial soils.
BCC 15.08 Frequently Flooded Areas	Benton County	▪ Frequently flooded areas are floodways and associated floodplains that are designated by the Federal Emergency Management Agency flood hazard classification or areas that occur within the 100-year floodplain.

Table 4.4-3: Laws and Regulations for Water Resources

Regulation, Statute, Guideline	Responsible Authority	Description
BCC 15.14 Fish and Wildlife Habitat Conservation Areas	Benton County	The following fish and wildlife habitat conservation areas are relevant to water resources: ▪ Areas where state or federal designated endangered, threatened, and sensitive species have a primary association. ▪ State-listed priority habitats and areas associated with state-listed priority species. ▪ Waters of the state, including lakes, rivers, ponds, streams, inland waters, underground waters, salt waters, and all other surface waters or water courses in Washington. ▪ Naturally occurring ponds, including their submerged aquatic beds, that provide fish or wildlife habitat. ▪ Lakes, ponds, streams, and rivers with introduced native fish populations. Development on conservation areas is prohibited unless federal or state permits or approvals are obtained. Riparian buffer requirements for rivers, lakes, ponds, and streams are: ▪ Type S (Shorelines of the State) standard buffer width: Type S waters are protected by the Benton County Shoreline Master Program, and the buffer width is dependent on the environmental designation and stream. Buffer widths for the Columbia and Yakima Rivers range from 0 feet for water-dependent activities (e.g., rural industrial) up to 200 feet in natural areas along the Columbia River and in the Hanford area. For other creeks, buffers are 100 feet for fish-bearing stream or 50 feet for non-fish-bearing, unless interlocal agreements are in place. ▪ Type F (fish) standard buffer width: 75 feet on parcels without streams with adjacent slopes of 10% or greater and 100 feet for parcels that have streams with adjacent slopes of 10% or greater. ▪ Type Np (non-fish perennial) and Ns (non-fish seasonal) standard buffer width: 50 feet on parcels without streams with adjacent slopes of 10% or greater and 100 feet for parcels that have streams with adjacent slopes of 10% or greater. A Hydraulic Project Approval would be required if work occurs within the ordinary high-water level.

Sources: WDFW 2008, 2009; Benton County 2018; Washington State Legislature 2022a, 2022b

Where available from the Application for Site Certification (ASC) for the Project, the potential for impacts on each of the water resources were quantified using measurable parameters. For example, impacts on surface water were determined for Project components by examining the number of streams impacted by temporary and permanent disturbance. However, for all impacts on water resources, a qualitative analysis was completed as described in Section 4.1.

4.4.2 Impacts of Proposed Action

Potential impacts related to the turbines, solar arrays, and battery energy storage systems (BESS) may be generalized when impacts are common within the Wind Energy Micrositing Corridors or Solar Siting Areas. Where impacts on water resources are anticipated to differ, the impacts are broken into the individual Project components. This Draft Environmental Impact Statement (EIS) describes potential impacts specific to each proposed turbine option (represented by Turbine Option 1 or Option 2), solar fields, BESSs, or substations where this information was available in the ASC (Horse Heaven Wind Farm, LLC 2021a). For the purpose of the water resources impact assessment, the Project components considered are described below**:**

- **Wind Energy Micrositing Corridor:** The Micrositing Corridor includes the wind turbine towers, access roads, crane paths, laydown areas, operation and maintenance (O&M) facilities, meteorological towers, collector lines, and transmission lines. Horse Heaven Wind Farm, LLC (Applicant), provided the areas of disturbance related to Turbine Option 1 but not for Turbine Option 2. Option 1 includes a greater number of turbines than Option 2. It is assumed that Option 2 would have the same or, potentially, fewer impacts on water resources than Option 1. Therefore, only Option 1 is assessed.
- **Solar Siting Areas:** Three Solar Siting Areas are proposed. Impacts from the Solar Siting Areas are further divided into the East Solar Field, County Well Solar Field, and Sellards Solar Field, where impacts are anticipated to differ. The three Solar Siting Areas differ in size based on total acreage of impact. Impacts from the Solar Siting Areas include areas under the solar arrays and within the permanent fence.
- **Battery Energy Storage Systems:** Three BESSs are proposed. Impacts on water resources from the BESSs are not anticipated to differ, so one assessment is provided that applies to all BESSs.
- **Substations:** Five substations are proposed. Each substation is anticipated to have the same impact on water resources, so one assessment is provided that applies to all substations.
- **Comprehensive Project:** The assessment of the comprehensive Project includes combined impacts from all components.

4.4.2.1 Impacts during Construction

The following Project activities would have the potential to cause impacts on water resources during construction:

- **Site clearing:** Vegetation and soils would be removed during construction. Soils unsuitable for construction (such as organics and silts) would be removed from the site, and load-bearing granular materials and aggregates would be brought to the site to facilitate construction. Site clearing would remove vegetation and expose soils, which could result in erosion from surface water runoff that could enter nearby waterways.
- **Stockpiling soil:** Removal of soil and storage on site for future work could increase the potential impacts for generation and mobilization of sediments into downstream water resources.
- **Site grading:** Moving material onto the site and placing fill or other soil on the site could increase the potential for generation and mobilization of sediments into downstream water resources. Change in contours could interrupt and alter the movement of water on the site.
- **Concrete work:** Project construction would use approximately 500,000 cubic yards of concrete for facility foundations (Horse Heaven Wind Farm, LLC 2021a). This would be considered “significant concrete work” under a Construction General Permit, as the total work would be greater than 1,000 cubic yards of concrete

placed or poured. Concrete would be required for the concrete pads that would be constructed for the wind turbines, substations, BESSs, and O&M facilities (Horse Heaven Wind Farm, LLC 2021a).

Mixing and pouring concrete on site for Project components such as turbine footings could increase the potential for release of alkaline wash water that could impact water resources. The use of an on-site concrete batch plant during construction of the Project was not analyzed. If an on-site concrete batch plant is required, supplemental environmental review would be required.

- **Increase in impervious surfaces:** "Impervious surface" refers to components of the built environment that have lower absorption capacity than natural ground cover. Examples of impervious surfaces include pavement, gravel, and concrete. Impervious surfaces, relative to natural ground cover, have reduced water infiltration rates relative to the amount of water that is lost as surface runoff. Project construction would increase impervious surfaces within the Lease Boundary through the creation of gravel roads, crane paths, and concrete turbine footings. This could increase the potential for surface water runoff to the receiving environment. Many biological and physical measures of stream quality decline with increasing cover of impervious surfaces in a watershed. As a basic framework, impervious surface cover within a watershed can be used to estimate stream quality (Centre for Watershed Protection 2003).
- **Water use:** Project construction would require water for road construction, concrete mixing, dust control, etc. According to the ASC, the Applicant is proposing to purchase and transport water from the City of Kennewick, or another authorized public water supply, to the site and would not withdraw water from sources on the site (Horse Heaven Wind Farm, LLC 2021a). If the Project requires large amounts of water for routine activities during construction or operations, water use on site presents the potential to impact public water supply as the water will be sourced from an available public utility. Water use on site would be required for concrete works during construction and would be required for building facilities during operations. This is discussed further in the public water supply subsection below. Additional assessment of public water supply as a social resource is discussed in Sections 3.15 and 4.15 (Public Services and Utilities).
- **Hazardous substances:** Use and storage of hazardous substances on site present the potential for an accidental spill that could enter waterways within the Lease Boundary.

Impact Description

This section evaluates impacts on water resources from the Proposed Action. The following potential impacts were identified for construction and are evaluated further for each water resource:

- Physical disturbance
- Water quality
- Hydrology
- Introduction of hazardous substances
- Public water supply security

For each impact, the adverse effects on surface water, runoff and absorption, floodplains, groundwater, and public water supply are further evaluated, where applicable. The five impacts and how they are used to assess impacts are defined below.

Physical Disturbance

Physical disturbance refers to a physical alteration of a water resource that results from Project disturbance. Physical disturbance could result from either a temporary or a permanent disturbance during construction.

- **Temporary disturbance** is defined as an alteration of a water resource for part or all of the duration of Project construction, which would be returned to pre-disturbance conditions following construction.
- **Permanent disturbance** is defined as an alteration of a water resource for the life of the Project, from construction through to decommissioning, which would be returned to pre-disturbance conditions following decommissioning.

Surface Water and Wetlands

The ASC identifies 31 ephemeral streams and two intermittent streams that intersect the Wind Energy Micrositing Corridor and Solar Siting Areas (see Section 3.4 of this Draft EIS) (Horse Heaven Wind Farm, LLC 2021a). The Project is anticipated to have the following impacts on these streams:

- Temporary disturbance from collection lines, roads, crane paths, and transmission lines would impact 19 of the 31 mapped ephemeral streams and both intermittent streams located within the Micrositing Corridor.
- Permanent disturbance of one ephemeral stream would occur within the ordinary high-water level (OHWL) and is anticipated to be required to construct a road culvert within the Micrositing Corridor.

The wetland located within the Lease Boundary is rated as Category IV according to the Washington State Department of Ecology's (Ecology's) Washington State Wetland Rating System for Eastern Washington and is not within the temporary or permanent disturbance areas (Hruby 2014; Horse Heaven Wind Farm, LLC 2021a). The wetland is located approximately 240 feet from the Micrositing Corridor, which meets the minimum buffer for a Category IV Wetland of 40 feet in Benton County (Benton County Code 15.04; Benton County 2018). No impacts on wetlands are anticipated to occur from Project construction.

Runoff/Absorption

Project construction could result in increased runoff or a loss of absorption capacity within the Lease Boundary. Site clearing would remove vegetation and soils that act to intercept water and aid in infiltration. Physical disturbance of vegetation and soils during Project construction could increase surface runoff and erosion. In addition, construction of roads, turbine footings, and other Project infrastructure would increase the area of impervious surface within the Lease Boundary, which could also reduce the absorption capacity and increase surface runoff.

In total, Project construction would result in 2,952 acres of temporary disturbance and 6,869 acres of permanent disturbance. Areas of disturbance associated with each Project component are summarized in Tables 2.1-1 and 2.1-2 of Chapter 2. The areas of permanent disturbance within the Micrositing Corridor are assumed to be primarily impervious surfaces, including gravel roads, concrete tower footings, tower pads, and other Project infrastructure.

Temporary disturbance areas would be revegetated following construction, restoring absorption capacity, while permanent disturbance areas would remain until decommissioning. Mulching would be used to stabilize soils on site until vegetation becomes established (Horse Heaven Wind Farm, LLC 2021a). In addition, permanent disturbance within the Solar Siting Areas relates to the total area of solar panels, which would be revegetated under and between the solar panels, following Project construction, with low-growing grasses and forbs. It is assumed that the absorption capacity after revegetation would be the same as pre-disturbance within Solar Siting Areas (Horse Heaven Wind Farm, LLC 2021a).

Soils within the Lease Boundary have moderate permeability. Given the depth of soils, surface water is expected to continue to infiltrate into the ground both during and after construction; therefore, increased surface runoff would be minimal (Horse Heaven Wind Farm, LLC 2021a). Construction is proposed to occur in a phased approach, enabling revegetation to be performed in areas of temporary disturbance where construction has been completed (Horse Heaven Wind Farm, LLC 2021a). This would limit the amount of exposed soil at any given time. Because the area's climate is seasonally dry, impacts resulting from increased runoff related to temporary or permanent disturbance would be most pronounced during heavy rainfall events. Storms in eastern Washington are typically high-intensity but short in duration (Ecology 2019). Erosion potential increases with the intensity and duration of rain events (Ritter 2012).

Based on the Applicant's habitat mapping, impervious surfaces are assumed to be associated with the developed/disturbed habitat category. Approximately 1.2 percent of the Lease Boundary (855.7 acres) is mapped as developed/disturbed (Horse Heaven Wind Farm, LLC 2021a). The Project would increase impervious surfaces within the Lease Boundary. Impervious surfaces resulting from Project construction would increase the total impervious surfaces by approximately 0.4 percent in the Lease Boundary, excluding the permanent disturbance within Solar Siting Areas. The total impervious surface, assuming no other development in the Lease Boundary, would increase to approximately 1.6 percent of the Lease Boundary.

Solar Siting Areas

Impervious surfaces include the permanent gravel access roads, concrete turbine footings, substations, and BESSs. Solar Siting Areas were excluded because, while they would involve permanent disturbance due to the solar arrays and installed fencing, they would be revegetated following construction and thus would not result in a permanent impervious surface on the ground. The ground under the solar arrays in the Solar Siting Areas would remain natural soil and be revegetated with low- growing grasses and forbs (Horse Heave Wind Farm, LLC 2021).

High flows can result in increased erosion if unmitigated, and erosion begins to occur within steam channels when impervious surfaces reach 5 percent of the watershed (Ecology 2019). Impervious surfaces could increase surface runoff to surface water within the Lease Boundary, potentially leading to increased erosion and sediment mobilization. Water within the Lease Boundary ultimately drains into the Yakima and Columbia Rivers, both of which are fish-bearing. However, Project construction would include a Stormwater Pollution Prevention Plan (SWPPP) that would identify appropriate mitigation and BMPs for reducing surface runoff from the Project. In addition, given the capacity for water infiltration of the surrounding Lease Boundary, surface runoff is anticipated to be intercepted by vegetation and infiltrate into the soil.

Floodplains

Floodplains are areas adjacent to water sources that are periodically flooded and provide several important ecological functions, including:

- **Water storage:** During flood events, floodplains serve to store excess water, slow water velocity, and reduce erosion.
- **Flow rate and erosion reduction:** Vegetated floodplains slow overland flow, which allows water time to infiltrate into the ground, thereby recharging groundwater and reducing erosion.

- **Filter water:** Vegetated floodplains can filter nutrients and pollutants from water before entering downstream waterways (FEMA 2020).

Within the Lease Boundary, approximately 149 acres of land within the 100-year floodplains/Frequently Flooded Areas are known to occur. Critical Aquifer Recharge Areas (CARAs) are identified by Ecology to protect community drinking water by preventing pollution of groundwater and maintaining supply (Ecology 2005). The ASC identifies approximately 0.8 acres of land within the 100-year floodplains/Frequently Flooded Areas, which are associated with CARAs, that would be temporarily impacted during Project construction (Horse Heaven Wind Farm, LLC 2021a). Temporary disturbance from construction would occur in less than 1 percent of the floodplains within the Lease Boundary.

The Applicant has included a commitment to avoid impacts on water resources by spanning or otherwise micrositing away from the streams (Horse Heaven Wind Farm, LLC 2021). The temporary impacts identified on the 100-year floodplain are associated with the transmission line. Clear-spanning the transmission line over the 100-year floodplain would avoid temporary disturbance, including vegetation removal and soil disturbance in the floodplain. Project construction and decommissioning would require site clearing, which would also temporarily impact the ecological functions provided by floodplains. No permanent features are proposed to be developed within the 100-year floodplain.

No physical disturbance of floodplains from the Solar Siting Areas, BESSs, or substations would occur during Project construction; therefore, impacts are not anticipated, and no further assessment is provided. Impacts from the comprehensive Project are rated the same as for the Micrositing Corridor.

Groundwater

Project construction would not use groundwater resources, and it is unlikely that the Project would affect groundwater quantity, quality, or flow direction (Horse Heaven Wind Farm, LLC 2021a). Water required for Project construction would not be sourced from groundwater resources on site but would be acquired from a public water supply and transported by truck to the site (Horse Heaven Wind Farm, LLC 2021a).

While groundwater would not be directly impacted, it could be indirectly impacted through loss of associated alluvial soils. Soil functions to filter pollutants from surface runoff, and soil biota can degrade pollutants prior to water reaching groundwater sources (Keestra et al. 2012). Impacts on groundwater from Project construction would include temporary disturbance of approximately 1.6 acres of alluvial soils (i.e., soils deposited by surface water) associated with CARAs. Approximately 160 acres of alluvial soils occur within the Lease Boundary. Less than 1 percent of alluvial soils would be temporarily disturbed during Project construction.

The alluvial soils that would be temporarily impacted are located within the Micrositing Corridor; therefore, the physical disturbance of groundwater resources is assessed for the Turbine Option 1 and Option 2 separately from the other Project components. Temporary disturbance of alluvial soils would result in an indirect impact on groundwater resources.

No other Project components would result in physical disturbance to groundwater resources, and they are not assessed further. Impacts that would result from the comprehensive Project would be the same as impacts from the Micrositing Corridor.

Water Quality

Surface Water and Wetlands

Project construction activities such as clearing, concrete works, soil stockpiling, and runoff from gravel roads could result in impacts on water quality. Impacts on surface water quality could occur where construction activities interact with ephemeral and intermittent streams. Ephemeral streams flow only during and shortly after major precipitation events, while intermittent streams contain water seasonally, typically during seasonal precipitation, winter snowmelt, and spring runoff (Nadeau 2015). Impacts on water quality would increase during precipitation events and during seasons of high flow such as winter snowmelt and spring runoff, as there would be potential for contaminants or sediments to be carried downstream.

Potential impacts on water quality include increased sedimentation, change in water pH from concrete, and change in water quality parameters. Impacts on water quality are rated as direct impacts from Project construction because they would occur at the same time and place as the activity. Mitigation measures, including an SWPPP and BMPs, would reduce the potential for impacts on water quality. Project construction within the Micrositing Corridor would interact with ephemeral and intermittent streams, which could impact water quality. Therefore, the Micrositing Corridor is rated separately from other Project components.

Ephemeral stream channels were identified in the East Solar Field and Sellards Solar Field (Section 3.4, Table 3.4-1). While neither temporary nor permanent disturbances are planned within the waterways, the close proximity of Project construction to surface water could impact water quality through surface runoff or other pollutants. Impacts on water quality from the East Solar Field and Sellards Solar Field would be minimized with the preparation of and adherence to an SWPPP, installation of BMPs, and the maintenance of vegetation adjacent to streams that can intercept water and allow infiltration into the ground before the water reaches a stream.

No stream channels were identified within or adjacent to the County Well Solar Field, BESSs, or substations; therefore, no impacts are anticipated.

Hydrology

Surface Water and Wetlands

Project construction would require the removal of vegetation and soil during temporary disturbance, which could impact stream hydrology (Ecology 2019). Stream hydrology in this context refers to the behavior of surface water and impacts on the movement of surface water. Impacts during Project construction could result in increased potential for erosion and mobilization of sediments or change in topography of the stream from increased surface runoff; however, ephemeral and intermittent streams are prone to these impacts naturally. Ephemeral and intermittent streams exhibit high variation in the amount of water flow at various points throughout the year compared to perennial streams, which have a more constant flow. In semi-arid and arid areas, this often results in greater surface runoff and erosion (Levick et al. 2008). The Applicant would revegetate areas of temporary disturbance along ephemeral and intermittent streams following construction, which can mitigate some of the impacts.

The construction of permanent gravel roads and wind turbine footings would also increase the total area of impervious surfaces within the Lease Boundary as part of the permanent disturbance from the Project, which could impact stream hydrology by changing long-term sedimentation rates (Ecology 2019). The gravel roads that interact with streams in the Lease Boundary are located within the Wind Energy Micrositing Corridor. In addition, the installation of a culvert at one of the intermittent streams, as currently proposed, could also increase the potential for erosion and sedimentation, resulting in changes to the stream channel. Over time, culverts can cause increased scour at the inlet and accumulation of sediment at the outlet, unless they are appropriately armored with large-diameter clean rock (i.e., riprap) and designed to accommodate seasonal high flows for the area (USDA 2009). The increase in impervious surfaces and installation of a culvert are assessed as indirect impacts because the impact may not be realized at the time of construction, although may become evident in the long term. Impacts from culvert installation may not occur at the time of construction, however over time, if the culvert is improperly sized, it could lead to impacts on hydrology.

Ephemeral and intermittent streams would be temporarily and permanently impacted by construction within the Wind Energy Micrositing Corridor but would not be impacted during construction of other Project infrastructure. Therefore, the potential for impacts from Turbine Option 1 and Option 2 are assessed separately from other Project components. The potential impacts within the Wind Energy Micrositing Corridor are assessed for the proposed temporary disturbance and the proposed permanent disturbance.

Project construction of the Solar Siting Areas, BESSs, and substations would not result in temporary or permanent disturbance to the ephemeral and intermittent streams; therefore, impacts are not anticipated and the Project components are not assessed further. Assessment of the impacts of the comprehensive Project are the same as for the Micrositing Corridor.

Introduction of Hazardous Substance

Surface Water and Wetlands

Hazardous substances that would be required for Project construction include diesel fuel, synthetic lubricating oil, glycol-water mix, transformer mineral oil, concrete, and hydraulic fluid (Horse Heaven Wind Farm, LLC 2021a). During Project construction, there is potential that these hazardous substances could be accidentally released into surface water. Spills of hazardous substances would have the greatest impact on surface water during seasonally wet periods within the winter and spring months, and during periods of rainfall. During these times, ephemeral and intermittent streams could convey spilled hazardous substances beyond the Lease Boundary into downstream environments within the watershed. Spills could cause water or soil contamination, change water chemistry or quality, and impact fish habitat in downstream environments.

During Project construction, a hazardous substance spill could occur during equipment maintenance, fueling, or concrete placement, or as a result of improper maintenance procedures. The potential sources of hazardous substances during Project construction are anticipated to be small point sources, such as an oil leak from a piece of equipment. Where practicable, the Applicant proposes conducting work within streams outside the seasonally wet period and during dry conditions. Spill response equipment would be stored on site within each vehicle to respond to accidental release of hazardous substances (Horse Heaven Wind Farm, LLC 2021a).

Diesel products and hydrocarbons range in their chemical composition. In general, products are moderately soluble and are somewhat persistent in the environment. Because of its persistence, diesel can cause toxic effects on invertebrates and wildlife that live in water or sediments (API 2016). Diesel and other hydrocarbon-based products readily penetrate porous substances such as soil (API 2016).

Floodplains

Project construction could result in a spill of a hazardous substance that has the potential to impact floodplains. Diesel products and hydrocarbons range in their chemical composition and can cause soil contamination. Release of a hazardous substance that could occur during Project construction has the potential to impact vegetation within the adjacent floodplain areas that are not already disturbed from construction. Loss of vegetation within floodplain environments could impact the ecosystem services provided by floodplains, including slowing water runoff, trapping sediments, and improving water quality (Suchara 2018).

The introduction of a hazardous substance could occur for any Project component, but only the Wind Energy Micrositing Corridor would have potential to impact floodplains within the Lease Boundary. During Project construction, spills of a hazardous substance could occur during equipment maintenance, fueling, or concrete placement, or due to improper maintenance procedures. A Spill Prevention Control and Countermeasures (SPCC) Plan would be created for the Project (Horse Heaven Wind Farm, LLC 2021a). The potential sources for the introduction of hazardous substances are expected to be small point sources, and spill response equipment would be available on site (Horse Heaven Wind Farm, LLC 2021a).

The impact of the Solar Siting Areas, substations, and BESSs would be negligible as floodplains do not occur in these areas, and they are not assessed further. The impacts of the comprehensive Project would be the same as the Micrositing Corridor.

Groundwater

Project construction could result in the introduction of hazardous substances; however, impacts on groundwater would be unlikely. Diesel products and hydrocarbons range in their chemical composition. Diesel and other hydrocarbon products readily penetrate porous substances such as soil (API 2016). The movement of hazardous substances through porous soil would have the potential to impact groundwater. If hazardous substances contact groundwater, there would be the potential for impacts on water quality and water chemistry and, potentially, downstream impacts as well. The greatest area of potential impact would be areas of alluvial soils associated with CARAs within the Micrositing Corridor.

Depth to water within the Lease Boundary averages 184 feet. The SPCC Plan would include measures for preventing and controlling spills during construction and operations (Horse Heaven Wind Farm, LLC 2021a). Sources for accidental spills would likely be small point sources, and spill response equipment would be available on site. A critical component to preventing impacts on groundwater from an accidental spill is having resources available on site and having employees trained and prepared to respond to an incident.

Impacts on Public Water Supply during Drought or Water Shortage

Project construction activities that would require water include concrete pouring, fugitive dust control, and fire prevention, when required. Construction would require an estimated 220,000 gallons per day, for a total construction demand of approximately 120 million gallons of water (Horse Heaven Wind Farm, LLC 2021a). These impacts are based on the assumption that an on-site concrete batch plant would not be required during Project construction and that concrete would be transported by truck from an off-site concrete batch plant (Horse Heaven Wind Farm, LLC 2021a).

The City of Kennewick water supply services approximately 82,599 residents in the Kennewick area. Water is sourced from the Columbia River, Ranney Collector 4 Well, and Ranney Collector 5 Well, with approximately 38 percent from the Columbia River Water Treatment Plant and 62 percent from the Ranney Collector Wells (City of Kennewick 2020). Total annual production in 2020 was 4.139 billion gallons, corresponding to approximately 11.3 million gallons per day. The City of Kennewick has a goal of reducing water demand per capita by 1 percent each year through to the year 2027 (City of Kennewick 2020). Project construction, if sourced solely from the City of Kennewick, would require approximately 2 percent of the city’s daily water production. The construction schedule is estimated to occur over two years (Horse Heaven Wind Farm, LLC 2021a). The Applicant has not provided alternative water sources for Project construction.

Water used for construction would be required for all Project components. The estimate of 120 million gallons of water is for the comprehensive Project. It is assumed the water required for individual Project components would be less than the comprehensive Project. The impact on water supply would be direct. The magnitude is rated low for individual Project components and medium for the comprehensive Project. The duration would be temporary, as impacts would be anticipated if water demand for construction exceeds available supply, particularly in the event of a drought or when the City of Kennewick needs to impose water restrictions to conserve for other uses, such as domestic consumption and fire response. The likelihood is rated feasible as water would be required for construction. The spatial extent would be regional as impacts on public water supply could affect the regional scale.

Turbine Option 1 and Turbine Option 2

The impact ratings for Turbine Option 1 and Option 2 are described below. The ASC provides only disturbance data for Turbine Option 1, and therefore, impacts from Turbine Option 2 on water resources are anticipated to be the same.

- **Physical Disturbance:** The physical disturbance to water resources is rated low magnitude. Physical disturbance within the Micrositing Corridor would temporarily impact 19 ephemeral streams, two intermittent streams, and less than 1 percent of alluvial soils within the Lease Boundary. Temporary disturbance in the 100-year floodplain is assumed to be avoidable by clear-spanning the transmission line over the 100-year floodplain. Permanent disturbance from construction would impact one intermittent stream. Mitigation measures including applications for a Hydraulic Project Approval, preparation of an SWPPP, and implementation of BMPs would reduce the impacts on water resources during construction. The duration of the impacts is rated short term for temporary disturbance and long term for permanent disturbance. The likelihood of impact is rated unavoidable. While the ASC indicates that disturbance to these water resources would be required for construction, Applicant commitments would reduce the likelihood of impact. The spatial extent is rated confined to the Lease Boundary. Temporary and permanent disturbance within the Micrositing Corridor would impact a large area in the Lease Boundary through vegetation removal and soil disturbance, which are important for intercepting and absorbing water.
- **Water Quality:** Impacts on water quality are rated low magnitude because the streams on site are dry for most of the year. The duration of impacts is rated temporary as the impacts would only affect water quality if water were present in the streams. The likelihood of impacts on water quality during construction is rated as unlikely, as scheduling construction activities near streams during the dry season along with BMPs would minimize the chance of occurrence. The spatial extent of the impact is rated local because impacts on water quality could impact downstream environments outside the Lease Boundary.
- **Hydrology:** Impacts on hydrology from Project construction would be direct. The impact is rated low magnitude. The duration is rated short term for temporary disturbance and long term for permanent disturbance. The permanent disturbance relates to the potential impacts on stream hydrology following the culvert installation in the intermittent stream. The likelihood of impacts from temporary disturbance during construction is rated as unlikely with implementation of Applicant commitments consistent with the SWPPP and Temporary Erosion and Sediment Control (TESC) plan. The spatial extent is rated limited. The likelihood of impacts from permanent disturbance (i.e., the culverted intermittent stream) is rated unavoidable, as a culvert is anticipated to be required. The impacts would be minor, provided that the culvert is appropriately designed (i.e., sized) to minimize restriction on flows; installed with a headwall at the intake and outlet to convey flows into the culvert (thereby minimizing the potential for flows bypassing the culvert), and protected

with riprap armoring at the inlet and outlet to minimize erosion and scour. The spatial extent is rated limited due to the small area within the Lease Boundary.

- **Introduction of Hazardous Material:** Introduction of hazardous substances would be a direct impact on water resources because it would occur at the time and place of the activity. The impacts are rated low magnitude. Potential spills during construction would likely be small point sources. Applicant committed measures would minimize the risk. The duration is rated temporary with implementation of mitigation measures, including an SPCC Plan. Spill response equipment would also be stored on-site at construction locations, which would provide an immediate response to spills should they occur. The likelihood is rated as unlikely. The spatial extent is rated as local, as impacts could extend beyond the Lease Boundary during high-rainfall events or the wet season.
- **Impacts on Public Water Supply:** For impacts on public water supply, the magnitude is rated low and the duration is rated temporary. The likelihood is rated feasible. Water would be required for construction and concrete is a water-intensive material; however, impacts on public water supply would be anticipated only during drought or water shortage. The spatial extent would be regional as impacts on public water supply could affect the regional scale.

Solar Siting Areas

The impact ratings for the Solar Siting Areas during Project construction are described below.

- **Physical Disturbance:** The impacts from physical disturbance of water resources are rated low for the Solar Siting Areas. Impacts are mainly related to vegetation clearing and soil disturbance that could impact absorption capacity during construction. Mitigation measures including an SWPPP and TESC plan would reduce the risk. The duration is rated short term for temporary disturbance and permanent disturbance. Permanent disturbance within the Solar Siting Areas is associated with areas under the solar arrays; however, the Applicant has committed to revegetating under solar arrays following construction. The likelihood is rated as unavoidable, and the spatial extent is rated confined.
- **Water Quality:** Based on the field-delineated streams by the Applicant, ephemeral stream channels were identified in the East Solar Field and Sellards Solar Field. Impacts on water quality could result to ephemeral streams adjacent to disturbance areas associated with construction of the solar fields. The magnitude of impact is rated negligible as a vegetated buffer would be maintained between the physical disturbance and the streams. While temporary and permanent disturbance are not planned within the stream channel, there is potential that surface runoff from construction could impact water quality within the ephemeral stream channels. The Applicant commitments, including an SWPPP, installation of BMPs, and the maintenance of vegetation adjacent to streams that can intercept water and allow infiltration into the ground before reaching a stream, which would minimize the impact. The duration of impacts would be temporary as impacts would only affect water quality if water were present in the streams. The likelihood of impacts is rated as unlikely. The spatial extent of the impact on water quality would be local because impacts on surface water quality could impact downstream environments outside the Lease Boundary.

  The Applicant did not identify any field-delineated streams in the County Well Solar Field. National Wetland Inventory Mapping shows streams within the County Well Solar Field, but none are located within the proposed disturbance for the solar arrays. The impact ratings are identical to the East Solar Field and Sellards Solar Field. Magnitude of impacts is rated negligible. The duration is rated temporary. The likelihood is rated unlikely. The spatial extent is rated local.

- **Hydrology:** No impacts are anticipated from the Solar Siting Areas, and no further assessment is required.
- **Introduction of Hazardous Material:** The impacts from the introduction of hazardous substances are rated negligible in magnitude as construction activities would be sited away from water resources. In the event of a spill, potential releases of hazardous materials on site would likely be small point sources that are expected to be contained using spill response equipment. The duration of impact would be temporary as effective mitigation measures could address a spill quickly. The likelihood is rated as unlikely. The spatial extent would be limited as movement beyond the initial release point would not be anticipated.
- **Impacts on Public Water Supply:** Impact ratings are identical to Turbine Option 1 and Option 2. The magnitude of impacts on public water supply from construction within the Solar Siting Areas is rated low. The duration is rated temporary. The likelihood is rated feasible, and the spatial extent would be regional.

Battery Energy Storage Systems

The impact ratings for the BESS are described below based on the impact descriptions in Section 4.4.2.1.

- **Physical Disturbance:** No impacts on surface waters are anticipated; however, absorption capacity could be impacted by construction through vegetation removal and soil disturbance. Impacts from physical disturbance are rated low magnitude. The duration of impacts is rated short term for temporary disturbance and long term for permanent disturbance. The likelihood is rated unavoidable, and the spatial extent is rated limited.
- **Water Quality:** Impacts on water quality from construction of the BESS are not anticipated, and no further assessment is required.
- **Hydrology:** Impacts on hydrology from construction of the BESS are not anticipated, and no further assessment is required.
- **Introduction of Hazardous Material:** The magnitude of impacts on surface waters are rated negligible and the duration of impact is rated temporary. The likelihood of impacts on surface waters is rated as unlikely and the spatial extent would be limited. Hazardous material would not mobilize into waterways due to the siting of BESS away from streams.
- **Impacts on Public Water Supply:** The magnitude of impact on public water supply from BESS construction is rated low and the duration is rated temporary. The likelihood is rated feasible, and the spatial extent would be regional.

Substations

The impact ratings for substations are described below based on the impact descriptions in Section 4.4.2.1.

- **Physical Disturbance**: Construction of the substations would not impact streams or wetlands; however, physical disturbance from vegetation clearing and soil disturbance could impact absorption capacity. Impacts from physical disturbance during substation construction are rated low magnitude. The duration is rated short term for temporary disturbance and long term for permanent disturbance. The likelihood is rated unavoidable, and the spatial extent is rated limited.
- **Water Quality:** Impacts on surface waters are not anticipated, and no further assessment is required.
- **Hydrology**: Impacts on surface waters are not anticipated, and no further assessment is required.

- **Introduction of Hazardous Material:** Impact ratings are identical to the impact ratings for the BESS. The magnitude of impacts on water resources are rated negligible and the duration of impact is rated temporary. The likelihood is rated as unlikely. The spatial extent would be limited.
- **Impacts on Public Water Supply**: The magnitude of impacts on public water supply is rated low and the duration is rated temporary. The likelihood is rated feasible, and the spatial extent is rated regional.

Comprehensive Project

The impact ratings for the comprehensive Project are described below based on the impact descriptions in Section 4.4.2.1.1.

- **Physical Disturbance:** Impacts from physical disturbance are rated identical to impacts from Turbine Option 1 and Option 2. The magnitude is rated low. The duration would be short term for temporary impacts and long term for areas of permanent disturbance. The likelihood is rated unavoidable. The spatial extent is rated confined.
- **Water Quality**: Impacts on water quality from the comprehensive Project are rated identical to impacts from Turbine Option 1 and Option 2. The impacts are rated low magnitude and the duration of impacts is rated temporary. The likelihood of impacts on water quality is rated unlikely and the spatial extent of the impact is rated local.
- **Hydrology**: Impacts on hydrology from the comprehensive Project is rated identical to the impacts from the turbines. The impact is rated low magnitude. The duration is rated short term for temporary disturbance and long term for permanent disturbance. The permanent disturbance relates to the potential for impacts on stream hydrology following the culvert installation in the intermittent stream. The likelihood of impacts from temporary disturbance is rated unlikely, and permanent disturbance is rated as unavoidable, as a culvert is anticipated to be required. The spatial extent is rated limited.
- **Introduction of Hazardous Material**: The impacts from the introduction of hazardous material is rated identical to the turbines. The magnitude is rated low, and the duration is rated temporary. The likelihood is rated as unlikely, and the spatial extent is rated as local.
- **Impacts on Public Water Supply**: Impacts on public water supply from the comprehensive Project are rated medium due to the larger water use required by the sum of Project components in comparison to the individual components. The duration of impacts would be rated temporary. The likelihood is rated feasible, and the spatial extent is rated regional.

4.4.2.2 Impacts during Operation

During Project operation, the following activities could result in impacts on water resources:

- Washing solar panels
- Runoff from impermeable surfaces
- Storing and using hazardous substances on the site
- Drought or water shortage that impacts public water supply

Impacts on water resources during operation include the following:

- Increase in surface water runoff
- Increase in sediment mobilization from surface runoff
- Change in water quality from surface water runoff
- Introduction of hazardous substances

Impact Description

Panel Washing

During operation, solar panel washing may be required to remove dirt, airborne dust, pollution, and other particulates that accumulate on the surface of the panels. This accumulation can reduce sunlight penetration and therefore efficiency of solar electricity production (Sugiartha et al. 2019). Washing solar panels restores panel efficiency. Based on the ASC, the estimated water use across all three solar areas would be approximately 2,025,000 gallons per year, or an estimated 675,000 gallons of water per solar field, if required (Horse Heaven Wind Farm, LLC 2021a). The Applicant indicates that the frequency of panel washing is presently unknown and that, if required, panel washing would occur once per year (Horse Heaven Wind Farm, LLC 2021a).

As a conservative estimate, the Applicant provided an assessment of the quantity of water that would reach the soil surface. If exactly one-third of the estimated panel washing water were used on the smallest Solar Siting Area, and if all water were to run off the solar panels, assuming no evaporation, the depth of water on the ground would be 0.012 inches across Sellards Solar Field. It is likely that all the water would infiltrate into the ground, based on the moderate infiltration rate of soils on site (Horse Heaven Wind Farm, LLC 2021a). Vegetation under the solar panels would also increase interception and slow the rate at which water reaches the ground, aiding in water infiltration. Areas within fence lines of the Solar Siting Areas would be vegetated except where permanent access roads and other impervious surfaces are required (Horse Heaven Wind Farm, LLC 2021a). Simulations of runoff around solar panels indicate that increased runoff is not anticipated where vegetation is well-maintained under solar panels or in the areas between the solar panels (Cook and McCuen 2013).

Panel washing would use water only without additives (Horse Heaven Wind Farm, LLC 2021b). The water used to wash solar panels would be unlikely to cause increased erosion within the Lease Boundary. During panel washing, most of the water would infiltrate directly into the ground. In the event that some of the water did not infiltrate directly into the ground in the vicinity of panels, it would be unlikely to reach any of the intermittent or ephemeral streams since it would be intercepted by vegetation in the vegetated strips between the rows of solar panels (Horse Heaven Wind Farm, LLC 2021a). The distance between solar panels would be generally twice the height of the solar panels and would provide sufficient surface area to slow water runoff and allow water infiltration (Horse Heaven Wind Farm, LLC 2021a).

Panel washing would only be required for the solar arrays; therefore, the impacts of the Micrositing Corridor, substations, and BESSs are considered negligible and are not assessed further. Solar panel washing would have an indirect impact on surface water and runoff/absorption. The impacts of panel washing on the comprehensive Project are anticipated to be the same as for the Solar Siting Areas.

Panel washing is not anticipated to impact floodplains or groundwater resources. The impacts of panel washing on public water supply are assessed separately.

Surface Water Runoff from Impervious Surfaces

Project operation could increase surface water runoff from impervious surfaces. Project infrastructure with impervious surfaces includes the tower footings for the wind turbines and meteorological towers, permanent gravel roads, and areas for O&M facilities. Compacted gravel roads have low water infiltration rates in comparison to natural soil and can result in overland flow, particularly after rainfall events, although they have higher infiltration rates than asphalt paved surfaces. Increased surface water runoff could result in increased erosion and increased sedimentation into adjacent streams or the wetland.

Increase in impervious structures within a watershed can impact stream quality. Because less water infiltrates the ground, more water occurs as surface runoff. In extreme cases, urban development has altered the base flow of streams and can convert ephemeral streams into perennial streams due to changes in water inputs (e.g., irrigation) and decreased infiltration (Centre for Watershed Protection 2003). Furthermore, positive correlations exist between increasing impervious surfaces and increasing peak discharge (Centre for Watershed Protection 2003). Peak discharge is the maximum rate of flow during a storm event.

The wind turbines, meteorological towers, and gravel roads are located predominantly within the Micrositing Corridor. Increased surface water runoff is an indirect impact of Project operations.

The substations and BESSs are not anticipated to impact surface water runoff during operations and are not assessed further. The Solar Siting Areas are not anticipated to impact surface water runoff from impervious surfaces as the areas under the arrays would be planted with low-growing grasses and forbs and would maintain absorption capacity. The comprehensive Project is rated the same as the Micrositing Corridor.

Introduction of Hazardous Substances

Hazardous substances that would be required for Project operation include diesel fuel, synthetic lubricating oil, glycol-water mix, transformer mineral oil, and hydraulic fluid (Horse Heaven Wind Farm, LLC 2021a). Potential impacts of these substances are described in Section 4.4.2.1. Activities during Project operation that could result in the introduction of hazardous substances include fueling of vehicles and maintenance of Project infrastructure. Accidental releases are anticipated to be small, point source releases. Spill response equipment would be located on-site during Project operations (Horse Heaven Wind Farm, LLC 2021a). Training would be given to all on-site workers to provide awareness of hazardous substances stored on site and how to properly store and clean hazardous substances (Horse Heaven Wind Farm, LLC 2021a).

Impacts from the introduction of hazardous substances have the potential to occur for all Project components. Water resources are located only in a few areas of the Lease Boundary and are generally ephemeral and/or intermittent streams and therefore do not convey year-round flows. Potential impacts of the introduction of hazardous substances are considered direct impacts.

Surface Water

Ephemeral and intermittent streams would cross Project infrastructure within the Micrositing Corridor only, but not within the Solar Siting Areas, substations, or BESSs.

Floodplains

The only areas of floodplain are located within the Micrositing Corridor. No permanent structures are sited within the 100-year floodplains and no interaction is anticipated.

Groundwater

Groundwater resources are not anticipated to be impacted by the introduction of hazardous substances as no permanent structures are sited within the alluvial soils associated with CARAs, and no further assessment is provided.

Impacts on Public Water Supply

Solar panel washing may be required in order to optimize performance and efficiency. If needed during operations, the solar panels are estimated to be washed once per year; however, the frequency with which solar panel washing would occur may be altered depending on the recommendations by the selected solar panel manufacturer (Horse Heaven Wind Farm, LLC 2021a). For the purpose of the assessment, it is assumed that solar panels would be washed at a maximum frequency of once per year. It is anticipated that up to 0.5 gallons of water would be required per solar module on average, or up to approximately 2,025,000 gallons per year, if required (Horse Heaven Wind Farm, LLC 2021a). In addition, water would be required for the O&M facilities. An estimated 5,000 gallons per day is estimated for kitchen and bathroom use, or approximately 1,825,000 gallons per year (Horse Heaven Wind Farm, LLC 2021a). Combined, Project operations could require up to approximately 3,850,000 gallons of water per year from the local public water supply.

Water for panel washing, if required, and for O&M facilities, would be required for the duration of operations. A potential impact on public water supply from Project operation would be decreased water security, primarily during drought or water shortage. The water used for Project operations would be transported to the site by truck, and presently the City of Kennewick has been identified as the potential provider, but the Applicant may use other private sources with valid water rights (Horse Heaven Wind Farm, LLC 2021a). During operations, water use for panel washing would be minimized by using methods that reduce the amount of water required such as using robotic panel washing equipment (Horse Heaven Wind Farm, LLC 2021a).

The City of Kennewick water supply services approximately 82,600 residents in the Kennewick area. Water is sourced from the Columbia River, Ranney Collector 4 Well, and Ranney Collector 5 Well, with approximately 38 percent from the Columbia River Water Treatment Plant and 62 percent from the Ranney Collector Wells (City of Kennewick 2020). Total annual production in 2020 was 4.139 billion gallons, corresponding to approximately 11.3 million gallons per day. The City of Kennewick has a goal of reducing water demand per capita by 1 percent each year through to 2027 (City of Kennewick 2020). The amount of water that would be required for panel washing and O&M facilities represents approximately 0.09 percent of the annual water production of the City of Kennewick.

It is assumed that panel washing would only be required for the Solar Siting Areas but water for O&M facilities would be required for all Project components. Therefore, the greatest impact on public water supply would be from the comprehensive Project and Solar Siting Areas. However, in all cases the total amount of water required by the Project is less than one percent of the City of Kennewick’s yearly water supply.

Turbine Option 1 and Turbine Option 2

The impact ratings associated with Turbine Option 1 and Option 2 are described below and are anticipated to be the same during Project operation.

- **Surface Water Runoff from Impervious Surfaces**: The impact of increased surface water runoff from impervious surfaces is rated low. The Project would increase impervious surfaces by approximately 0.4 percent in the Lease Boundary. While this is a small change overall in the Lease Boundary, the increase in impervious surfaces would be a 33 percent increase from current levels. Mitigation measures proposed by the Applicant are anticipated to reduce surface runoff to a similar level as existing conditions; therefore, the magnitude is rated low. The duration is rated temporary. While the impervious surfaces would persist from construction to decommissioning, the impacts would be limited to periods of heavy rainfall events, which typically occur in the spring and fall months. The likelihood is rated unlikely. The spatial extent is rated local because, during peak flows, runoff from the site could be transported beyond the Project Lease Boundary.

- **Introduction of Hazardous Substances**: Impacts from the introduction of hazardous substances are rated negligible during Project operations. Impacts from hazardous substances are rated temporary in duration. The likelihood is rated unlikely, and the spatial extent is rated limited.
- **Impacts on Public Water Supply**: Impacts on public water supply would be a direct impact. The magnitude is rated low for Turbine Option 1 and Option 2 because the amount of water required to run O&M facilities is less than one percent of the annual production by the City of Kennewick. The duration of impact is rated temporary as impacts are most likely during periods of drought or water shortage. The likelihood is rated feasible. The spatial extent is rated regional because impacts on local water supply would affect the broader region.

Solar Siting Areas

- **Panel Washing**: The magnitude of the impact from panel washing is rated negligible magnitude. Impacts are rated negligible because if infiltration does not occur under the solar panels, interception by vegetation and infiltration in the surrounding area would be anticipated prior to water reaching a stream. Vegetated strips would minimize the potential for soil erosion and mobilization of sediments as surface water runoff and would help trap sediment prior to entering streams. The duration for impacts is rated temporary as solar panel washing would occur only once per year. The likelihood is rated unlikely because water is expected to infiltrate the ground (Horse Heaven Wind Farm, LLC 2021a). The spatial extent is confined to the Lease Boundary.
- **Surface Water Runoff from Impervious Surfaces**: No impacts are anticipated, and no further assessment is required.
- **Introduction of Hazardous Substances**: Impacts on water resources are not anticipated, and no further assessment is required.
- **Impacts on public Water Supply:** Operation of the Project would have a direct impact on public water supply. The magnitude is rated low as the Solar Siting Areas would require less than one percent of the current annual water production of the City of Kennewick. The duration would be temporary as impacts would be anticipated during drought or water shortage. The likelihood is rated feasible. Water for the O&M facilities would be required. Panel washing may be required once per year to optimize the performance and efficiency of the solar panels. The spatial extent would be regional because if impacts on local water supply occurred, this would affect the broader region.

Battery Energy Storage Systems

- **Surface Water Runoff from Impervious Surfaces**: No impacts are anticipated, and no further assessment is required.

- **Introduction of Hazardous Substances**: Impacts on water resources are not anticipated, and no further assessment is required.
- **Impacts on Public Water Supply**: Impact ratings are identical to the turbines because the BESS would still require O&M facilities. The magnitude of impact from BESS operations on public water supply is rated low and the duration of impact is rated temporary. The likelihood is rated feasible, and the spatial extent is rated regional.

Substations

- **Surface Water Runoff from Impervious Surfaces**: Impacts on surface water runoff from impervious surfaces associated with the operation of the substations is not anticipated, and no further assessment is required.
- **Introduction of Hazardous Substances**: Impacts on surface waters, floodplains, and groundwater from the introduction of hazardous substances from the operation of substations is not anticipated, and no further assessment is required.
- **Impacts on Public Water Supply**: Impact ratings are identical to the turbines because the BESS would still require O&M facilities. The magnitude is rated low, and the duration of impact is rated temporary. The likelihood is rated feasible, and the spatial extent is rated regional.

Comprehensive Project

- **Panel Washing**: The impact of panel washing from the comprehensive Project is identical to the Solar Siting Areas, as these are the only components that require panel washing. The magnitude of the impact is rated negligible. The duration is rated temporary. The likelihood is rated unlikely because water is expected to infiltrate the ground (Horse Heaven Wind Farm, LLC 2021a). The spatial extent is rated confined to the Lease Boundary.
- **Surface Water Runoff from Impervious Surfaces**: Impervious surfaces from the Project would be concentrated in the Micrositing Corridor. Impact ratings for the comprehensive Project are identical to the wind turbines. The impact of increased surface water runoff from impervious surfaces is rated low. The duration is rated temporary. The likelihood is rated unlikely. The spatial extent is rated local.
- **Introduction of Hazardous Substances**: Impacts from the introduction of hazardous substances are rated identical to the wind turbines. Impacts are rated negligible during Project operations with mitigation measures such as carrying spill equipment in all vehicles. Impacts from hazardous substances are rated temporary in duration. The likelihood is rated unlikely, and the spatial extent is rated limited.
- **Impacts on Public Water Supply**: Impacts from public water supply are identical to ratings for the Solar Siting Areas and consider both O&M facilities and panel washing. The magnitude is rated low and the duration is rated temporary. The likelihood is rated feasible, and the spatial extent is regional.

4.4.2.3 Impacts during Decommissioning

Impacts during Project decommissioning would be similar to impacts during construction (Section 4.4.2.1). Decommissioning would require temporary disturbance areas to facilitate the removal of Project components including the wind turbines, solar arrays, substations, BESSs, roads, transmission lines, and O&M facilities resulting in physical disturbance that could impact water resources. It is assumed that the same area of temporary disturbance that would be required during construction would also be required during decommissioning. Permanent disturbance areas would be decommissioned during Project decommissioning.

Potential impacts on water resources from Project decommissioning include:

- Physical disturbance to facilitate decommissioning
- Change in water quality
- Increase in surface runoff
- Change in hydrology of ephemeral and intermittent streams
- Introduction of hazardous substance

Impact Description

Physical Disturbance

Surface Water and Wetlands

The ASC identifies 31 ephemeral streams and two intermittent streams that intersect the Micrositing Corridor and Solar Siting Areas. Like construction, Project decommissioning would require temporary disturbance of 19 ephemeral streams and both intermittent streams. No permanent disturbance is anticipated during Project decommissioning.

The physical disturbance from temporary disturbance would be a direct impact on surface water. All disturbance of surface water would occur within the Micrositing Corridor; therefore, Turbine Option 1 and Option 2 were assessed separately from the other Project components.

No impacts relating to physical disturbance to ephemeral or intermittent streams or wetlands would occur within the Solar Siting Areas, BESSs, or substations. Assessment of impacts from the comprehensive Project would be the same as impacts from Turbine Option 1 and Option 2, as the only impacts from physical disturbance would occur within the Micrositing Corridor.

Runoff/Absorption

Project decommissioning would also result in loss or reduction of runoff and absorption capacity within the Lease Boundary. Site clearing to provide temporary access routes for decommissioning would remove vegetation and soils that act to intercept water and aid in water infiltration. Physical disturbance of vegetation and soils during Project decommissioning could increase surface runoff, resulting in the potential for increased erosion and sedimentation of surface water. In total, Project decommissioning would result in an estimated 2,957 acres of temporary disturbance, as described in Tables 2.1-1 and 2.1-2 of Chapter 2.

Temporary disturbance areas would be revegetated following decommissioning, restoring absorption capacity. Areas of permanent disturbance would also be returned to pre-disturbance conditions by removing Project infrastructure and revegetating, restoring runoff and absorption capacity.

Project decommissioning would have an indirect impact on runoff and absorption capacity. Removal of the permanent disturbance features such as wind turbine footings, would remove impervious ground in the Lease Boundary and would be a benefit to the area.

Floodplains

Approximately 0.8 acres of land within the 100-year floodplains/Frequently Flooded Areas, which are associated with CARAs, occur within disturbance areas of the Micrositing Corridor. These are associated with transmission line. Proposed mitigation would include spanning the 100-year floodplain to avoid temporary disturbance as described in Section 4.4.2.1. Therefore, Project decommissioning would also not require site clearing.

Physical disturbance of floodplains from the Solar Siting Areas, BESSs, and substations would not occur during Project decommissioning; therefore, impacts are not assessed further. The physical disturbance of floodplains from the comprehensive Project would be the same as within the Micrositing Corridor as this would be the only location where floodplains would be impacted.

Groundwater

Project decommissioning would result in the temporary disturbance of 1.6 acres of alluvial soils associated with CARAs (Horse Heaven Wind Farm, LLC 2021a). While groundwater would not be directly impacted, it could be indirectly impacted through loss of associated alluvial soil. Less than 1 percent of alluvial soils within the Lease Boundary would be disturbed during Project decommissioning. The temporary disturbance of 1.6 acres of alluvial soils within the Micrositing Corridor would be considered an indirect impact on groundwater resources.

No other Project components would result in physical disturbance to groundwater resources; therefore, the impacts would be negligible and are not assessed further. Impacts that would result from the comprehensive Project would be the same as impacts from within the Micrositing Corridor.

Water Quality

Surface Water

Project decommissioning activities such as clearing and soil stockpiling for temporary access could result in impacts on water quality. Impacts on surface water quality could occur where construction activities interact with ephemeral and intermittent streams. Impacts on surface water quality would be similar to those discussed in Section 4.4.2.1 for Project construction.

Only the Micrositing Corridor would require temporary disturbance of surface water for construction, and it is therefore assumed that this same area would be required during the decommissioning stage of the Project. The temporary disturbance of ephemeral and intermittent streams would have the potential to impact water quality. Impacts on water quality from within the Micrositing Corridor are considered a direct impact.

In addition, ephemeral stream channels were identified in the East Solar Field and Sellards Solar Field as described in Section 3.4, Table 3.4-1. While these stream channels would not be directly disturbed, there is potential that decommissioning could impact water quality within the channels through runoff. These two solar fields would have a direct impact on water quality.

No streams or wetlands would occur within the County Well Solar Field, BESS, or substations sites; therefore, impacts on water quality from Project decommissioning would not be expected and are not assessed further. Impacts of the comprehensive Project are rated the same as Turbine Option 1 and Option 2, as this incorporates the area of greatest potential impact.

Hydrology

Surface Water

The impacts of Project decommissioning on the hydrology of ephemeral and intermittent streams would be similar to the temporary disturbance during Project construction, as discussed in Section 4.4.2.1. No permanent disturbance would occur during Project decommissioning. The removal of the culvert on the intermittent stream within the Micrositing Corridor during decommissioning could restore the stream hydrology.

Where Project decommissioning would impact ephemeral and intermittent streams, there would be potential for impacts on hydrology. For Project decommissioning, it is assumed that this would be required within the Micrositing Corridor, similar to the construction stage of the Project. Project decommissioning would have a direct impact on hydrology within the Micrositing Corridor.

Decommissioning of the Solar Siting Areas, BESSs, and substations would not result in temporary disturbance of ephemeral and intermittent streams; therefore, no impacts are anticipated, and the Project components are not assessed further. The impacts from the comprehensive Project would be the same as those within the Micrositing Corridor.

Introduction of Hazardous Substance

Surface Water

Hazardous substances required for Project decommissioning would be similar to those required for Project construction. The potential impacts and sources are discussed in Section 4.4.2.1. Impacts of the introduction of hazardous substances on surface water are rated separately within the Micrositing Corridor from other Project components because Project decommissioning would require temporary disturbance within ephemeral and intermittent streams within the Micrositing Corridor. For all Project components, the introduction of hazardous substances would be a direct impact.

Floodplains

Project decommissioning could result in a spill of a hazardous substance that has the potential to impact floodplains. Impacts of spills on floodplains and their sources are discussed in Section 4.4.2.1. Accidental release of hazardous substances could occur for any Project component, but only the Micrositing Corridor would have the potential to impact floodplains in the Lease Boundary. Accidental release of hazardous substances would be a direct impact.

The Solar Siting Areas, substations, and BESSs do not overlap with floodplains, and impacts from an accidental spill are not anticipated. These Project components are not assessed further. The impacts of the comprehensive Project are rated the same as within the Micrositing Corridor.

Groundwater

Project decommissioning could result in the introduction of hazardous substances, although this would be unlikely to impact groundwater, for the reasons discussed in Section 4.4.2.1. Diesel products and hydrocarbons range in their chemical composition. Diesel and other hydrocarbon products readily penetrate porous substances such as soil (API 2016). The movement of hazardous substances through porous soil would have the potential to impact groundwater. If hazardous substances were to contact groundwater, there would be potential impacts on water quality, water chemistry, and downstream areas. The greatest area of potential for an impact would be areas of alluvial soils associated with CARAs within the Micrositing Corridor.

Depth to water in the Lease Boundary averages 184 feet. As noted above, sources for accidental spills are anticipated to be small point sources, and spill response equipment would be available on site. The effectiveness of on-site spill response equipment would largely depend on the training of the Applicant's contractors conducting the decommissioning activities. It is not anticipated that decommissioning of any Project components would result in a spill that impacts groundwater, and this impact is not assessed further.

Impacts on Public Water Supply during Drought or Water Shortage

Estimates of water supply required for Project decommissioning are not provided in the ASC. However, the total amount of water required per year during decommissioning is anticipated to be less than for Project construction, which is estimated to be 120 million gallons per year (Horse Heaven Wind Farm, LLC 2021a). This is because certain activities, such as concrete pouring, would not be required during decommissioning. However, some activities, such as fugitive dust control, would still require water.

Turbine Option 1 and Turbine Option 2

- **Physical Disturbance**: The impact of physical disturbance on water resources is rated low magnitude. The duration is rated short term as the disturbance areas would be returned to pre-disturbance conditions following decommissioning. The likelihood is rated unavoidable. While temporary disturbance areas would be required for decommissioning, mitigation measures would reduce the likelihood of impact. The spatial extent is rated confined within the Lease Boundary, due to the size of temporary disturbance required to remove the wind turbines.
- **Water Quality**: Impacts on water quality are rated low magnitude. The duration of impact is rated as temporary as the impact would only affect water quality if water were present in the streams. The likelihood of impacts is rated as unlikely, as mitigation measures would minimize the risk. The spatial extent of the impact would be local because impacts on water quality could impact downstream environments outside the Lease Boundary.
- **Hydrology**: Impacts on hydrology are rated low as areas of permanent disturbance and temporary disturbance would be restored to pre-disturbance conditions. The duration of the impacts is rated short term. The likelihood of impacts is rated as unlikely because of proposed mitigation measures. The spatial extent would be limited to a small area of the Lease Boundary where the Micrositing Corridor intersect ephemeral and intermittent streams.
- **Introduction of Hazardous Substances**: Impacts from the introduction of hazardous substances are rated low magnitude. The duration would be temporary as effective mitigation measures and spill response equipment on site could quickly address a spill, provided that site personnel are trained on, and equipped to perform, deploy and use spill response equipment. The likelihood is rated as unlikely. The spatial extent has the potential to be local and extend beyond the Lease Boundary during high-rainfall events or the wet season.
- **Impacts on Public Water Supply**: The impact on water supply would be direct. Impacts are rated as low magnitude. The duration would be temporary as water would be required for decommissioning, but impacts would only be anticipated during drought or water shortage. The likelihood is rated as unlikely as adjustments to schedule for the decommissioning activities could alleviate demand on public water supply. The spatial extent is regional as potential for impacts on public water supply could impact the regional scale.

Solar Siting Areas

- **Physical Disturbance**: The impact from physical disturbance during decommissioning is rated low magnitude. Areas of modified habitat under the solar arrays would require disturbance, including vegetation clearing and soil disturbance, to remove the solar arrays. This could impact absorption capacity. The duration is rated short term as revegetation would occur following decommissioning. The likelihood is rated as unavoidable. The spatial extent is rated as confined.
- **Water Quality**: For the Solar Siting Areas, the impacts on water quality are rated as negligible magnitude because water would be intercepted by vegetated buffers and would likely infiltrate the ground before entering a watercourse. The duration of impacts is rated temporary as the impact would only affect water quality if water were present in the streams. The likelihood of impacts on water quality is rated as unlikely, as mitigation measures would reduce the risk. The spatial extent of the impact on water quality would be local because impacts on water quality could impact downstream environments outside the Lease Boundary.
- **Hydrology**: No impacts on hydrology are anticipated, and no further assessment is required.
- **Introduction of Hazardous Substances**: Impacts from introduction of hazardous substances are rated negligible magnitude. No work would occur directly in a stream. Any accidental release is anticipated to be small and would be contained by trained site personnel using spill response equipment. The duration would be temporary, as effective mitigation measures could address a spill quickly. The likelihood is rated as unlikely. The spatial extent would be limited as movement beyond the initial release point would not be anticipated.
- **Impacts on Public Water Supply**: The impact ratings are identical to the wind turbines. Impacts are rated low magnitude, and the duration would be temporary. The likelihood is rated as unlikely. The spatial extent is regional.

Battery Energy Storage Systems

- **Physical Disturbance**: Impacts from physical disturbance are rated low magnitude. Small areas of vegetation clearing and soil disturbance would be required to remove the BESSs. The duration would be short term as soil replacement and revegetation would occur following decommissioning. The likelihood is unavoidable. The spatial extent is limited.
- **Water Quality**: There are no anticipated impacts on surface waters, and no further assessment is required.
- **Hydrology**: There are no anticipated impacts on surface waters, and no further assessment is required.
- **Introduction of Hazardous Substances**: Impact ratings are identical to the Solar Siting Areas. Impacts are rated negligible magnitude. The duration is rated temporary. The likelihood is rated as unlikely. The spatial extent is rated limited.
- **Impacts on Public Water Supply**: Impacts on public water supply are identical to those anticipated for the wind turbines. Impacts are rated low magnitude. The duration is rated temporary, and the likelihood is rated as unlikely. The spatial extent is rated regional.

Substations

- **Physical Disturbance**: Impact ratings are identical to those anticipated for the BESS. The impact from physical disturbance is rated low magnitude. The duration is rated as short term. The likelihood is unavoidable. The spatial extent is limited.
- **Water Quality**: No impacts on surface waters are anticipated, and no further assessment is required.
- **Hydrology**: No impacts on surface waters are anticipated, and no further assessment is required.
- **Introduction of Hazardous Substances**: Impact ratings are rated identical to those anticipated for the Solar Siting Areas. Impacts are rated negligible in magnitude. The duration is rated temporary. The likelihood is rated as unlikely. The spatial extent is rated limited.
- **Impacts on Public Water Supply:** Impacts on public water supply are identical to the wind turbines. Impacts are rated low magnitude. The duration would be temporary. The likelihood is rated as unlikely. The spatial extent is regional.

Comprehensive Project

- **Physical Disturbance**: Impact ratings are identical to those anticipated for the wind turbines. The physical disturbance is rated low magnitude, and the duration is rated short term. The Project would require temporary disturbance but would be revegetated following decommissioning. The likelihood is rated unavoidable, and the spatial extent is rated confined.
- **Water Quality**: Impacts on surface waters are rated low magnitude, and the duration of impact is rated as temporary. The likelihood of impacts is rated as unlikely, and the spatial extent of the impact is rated as local.
- **Hydrology**: Impacts on hydrology are rated low, and the duration of the impacts would be short term. The likelihood of impacts is rated unlikely, and the spatial extent is rated limited.
- **Introduction of Hazardous Substances**: Impacts from the introduction of hazardous substances would be identical to those anticipated for the wind turbines. The impacts are rated low, temporary, unlikely, and local.
- **Impacts on Public Water Supply**: Impacts on public water supply are rated low magnitude. Construction of the comprehensive Project was rated medium; however, less water is anticipated for decommissioning as no concrete mixing would be required. The duration is rated temporary. The likelihood is rated as unlikely, and the spatial extent is regional.

4.4.3 Applicant Commitments and Identified Mitigation

This section describes measures that would reduce or compensate for impacts related to water resources from construction, operation, and decommissioning of the Project. These measures would be implemented in addition to compliance with the environmental permits, plans, and authorizations required for the Proposed Action.

Applicant Commitments

The Applicant has identified measures and/or best practices that are designed to prevent or minimize potential impacts on the affected environment for the Project. Measures presented by the Applicant in the ASC and taken into consideration in the characterization of potential impacts on water resources are discussed in Section 2.3 and summarized below (Horse Heaven Wind Farm, LLC 2021a).

Avoidance measures were largely achieved through Project design by adjusting the location of the Wind Energy Micrositing Corridor and Solar Siting Areas through refinement of the Project design. Applicant committed avoidance measures are provided and would be applied to the Project (Horse Heaven Wind Farm, LLC 2021a).

- Disturbance would only occur within the Wind Energy Micrositing Corridors and Solar Siting Areas proposed in the ASC and would not total more than 2,957 acres of temporary disturbance and 6,869 acres of permanent disturbance. The Micrositing Corridors and Solar Siting Areas are larger than the Project's final footprint to allow minor rerouting to optimize the design and to avoid natural environmental resources that may be discovered during the final design and preconstruction process.
- The design of the Project components avoids all direct impacts on wetlands through refinements of the footprint design of the Micrositing Corridor and Solar Siting Areas (Appendix K, Horse Heaven Wind Farm, LLC 2021a). One wetland was identified within the Lease Boundary, located approximately 240 feet from the Micrositing Corridor. The wetland is rated as a Category IV Wetland, and Benton Country Code Chapter 15.04 Wetlands would typically require a 40-foot standard buffer around the wetland for proposed work (Benton County 2018). As the Micrositing Corridor is well beyond the required buffer, disturbance of the wetland would be avoided.
- Impacts on waters of the state may be avoided by spanning (e.g., with the transmission line) or otherwise micrositing away from the streams. If these impacts cannot be avoided, indirect impacts on water quality can be minimized by working within the ordinary high water line during the dry season when no rain is predicted.
- The Applicant, through design of the Project components, would avoid permanent disturbance impacts on areas in 100-year flood zones/Frequently Flooded Area and alluvial soils associated with CARAs. No permanent disturbance would occur in these areas.

Applicant committed measures to minimize impacts on water resources are described below (Horse Heaven Wind Farm, LLC 2021a).

- The Project would be constructed in a phased approach, with completed areas revegetated following completion of construction.
- To control erosion and surface-water runoff during construction and operation, the Applicant would comply with a Construction Stormwater General Permit.
- The Project would comply with the National Pollutant Discharge Elimination System through adherence to a Construction Stormwater General Permit from Ecology.
- Water conservation would be implemented to the extent practicable by use of less water-intensive methods of dust suppression when possible, including use of soil stabilizers, tightly phasing construction activities, staging grading and other dust-creating activities, and/or compressing the entire construction schedule to reduce the time period over which dust suppression measures would be required.
- A TESC plan would be developed and implemented in accordance with the Stormwater Management Manual for Eastern Washington, detailing specific BMPs that would be used and where they would be placed, as well as the total disturbance area. The TESC plan would include measures to prevent erosion, contain sediment, and control drainage. The TESC plan would also include installation details of the BMPs, as well as notes, as required by the Stormwater Management Manual for Eastern Washington.

- A Stormwater Pollution Prevention Plan meeting the conditions of the Construction Stormwater General Permit for Construction Activities would be prepared and implemented prior to construction and again during decommissioning. The SWPPP would detail the activities and conditions at the site that could cause water pollution, and the steps the facility would take to prevent the discharge of any unpermitted pollution. All final designs would comply with the Stormwater Management Manual for Eastern Washington (Ecology 2019). The SWPPP would include the following 13 elements specified in the manual:
    1. Preserve Vegetation/Mark Clearing Limits
    2. Establish Construction Access
    3. Control Flow Rates
    4. Install Sediment Controls
    5. Stabilize Soils
    6. Protect Slopes
    7. Protect Drain Inlets
    8. Stabilize Channels and Outlets
    9. Control Pollutants
    10. Control Dewatering
    11. Maintain BMPs
    12. Manage the Project
    13. Protect Low Impact Development BMPs (Infiltration BMPs) (Ecology 2019)
- All final designs would conform to the applicable Stormwater Management Manual.
- Stabilized construction entrance and exit areas would be installed at locations where construction vehicles would access newly constructed roads, and/or require access to disturbed areas from paved roads. The stabilized construction entrance and exit areas would be inspected and maintained for the duration of the Project's lifespan.
- Clearing, excavation, and grading would be limited to areas of the Project area absolutely necessary for construction of the Project. Areas outside the construction limits would be marked in the field, and equipment would not be allowed to enter these areas or disturb existing vegetation. To the extent practicable, existing vegetation would be preserved. Where vegetation clearing is necessary, root systems would be conserved if possible.
- Excavated soil and rock from grading would be spread across the site to the natural grade and would be reseeded with native grasses to control erosion by water and wind.
- Silt fencing would be installed throughout the Project area as a perimeter control, including on the contour downgradient of excavations, around the O&M facilities, and around the substations.

- Straw wattles would be used to decrease the velocity of sheet flow stormwater to prevent erosion. Wattles would be used along the downgradient edge of access roads adjacent to slopes or sensitive areas.
- Mulch would be used to immediately stabilize areas of soil disturbance, and during reseeding efforts.
- Jute matting, straw matting, or turf reinforcement matting would be used in conjunction with mulching to stabilize steep slopes that were exposed during access road installation.
- Soil binders and tackifiers would be used on exposed slopes to stabilize them until vegetation is established.
- Concrete chutes and trucks would be washed out in dedicated areas near the foundation construction locations. This practice would prevent concrete washout water from leaving a localized area. Soil excavated for the concrete washout area would be used as backfill for the completed footing to ensure that the surface soils maintain infiltration capacity.
- Effluent discharge from concrete works, including on-site concrete batch plant operations, would be controlled as required by the Construction Stormwater General Permit and the Sand and Gravel General Permit to prevent contamination of stormwater runoff. BMPs used (including, but not limited to, Stormwater Management Manual for Eastern Washington BMPs C151E, C154E, and C252E) would include preferential off-site disposal where possible, establishment and maintenance of concrete washout areas when off-site disposal is not possible, and monitoring of effluent pH. Specific to operation of an on-site concrete batch plant, any impoundments for process water would be lined and the impoundment capacity adequate to provide treatment and flow control.
- Because the overall Project would meet the Construction Stormwater General Permit's definition of "significant concrete work" (i.e., greater than 1,000 cubic yards of concrete placed or poured), pH sampling would be completed as specified in the permit. If effluent exceeds the benchmark value, the high pH water would be either prevented from reaching surface water or neutralized. Site BMPs would be designed and implemented to avoid comingling of water, and any stormwater that has comingled with concrete wastewater would be considered process wastewater and managed appropriately. Additional sampling and monitoring requirements are identified in the Sand and Gravel General Permit guidance document, and these requirements would be followed (Ecology 1999).
- The Site Management Plan would include all required elements, including the site map, TESC Plan, Monitoring Plan, SWPPP, and SPCC Plan.
- An SPCC Plan would be prepared to prevent discharge of oil into navigable waters.
- To facilitate installation of the wind turbine generator footings, large excavations would be created. Soil from these excavations would be temporarily stockpiled and used as backfill for the completed footing. Silt fencing would be installed around the stockpiled material as a perimeter control. Mulch or plastic sheeting would be used to cover the stockpiled material. Soils would be stockpiled and re-used to minimize potential mixing of productive topsoils with deeper subsoils.
- After construction and decommissioning are each completed, the site would be revegetated with an approved seed mix. When required, the seed would be applied in conjunction with mulch and/or stabilization matting to protect the seeds as the grass establishes. Revegetation would take place as soon as site conditions and weather allow, following construction and decommissioning.

- If water crossings are needed, check dams and sediment traps would be used during the construction of low-impact ford crossings or culvert installations. The check dams and sediment traps would minimize downstream sedimentation during construction of the stream crossings.
- During construction and operation, source control measures would be identified in the SPCC Plan to reduce the potential of chemical pollution in surface water or groundwater during construction.
- To the extent practicable, construction activities would be scheduled to occur in the dry season, when soils are less susceptible to compaction and erosion. Similarly, soil disturbance would be postponed when soils are excessively wet, such as following a precipitation event.
- Equipment oil-filling, fueling, or maintenance activities would occur a substantial distance from watercourses or wetlands to minimize water quality impacts in the event of an accidental release. Oily waste, rags, or dirty or hazardous solid waste would be collected in sealable drums at the construction laydown yards, to be removed for recycling or disposal by a licensed contractor.
- During Project construction and operation, fuel or oil stored aboveground would be kept in secondary containment if it is located less than 600 feet from navigable waters of the state or near a drain that may impact navigable waters of the state.
- If Project components cannot avoid impacts on streams, indirect impacts on water quality would be minimized by only working within the OHWL during the dry season when no precipitation is predicted.
- If temporary or permanent impacts on ephemeral and intermittent stream channels cannot be avoided, and work in the OHWL is necessary, a Hydraulic Project Approval may be required and would be applied from the WDFW during final design of the Project.
- The Applicant would monitor erosion during operation of the Project on a regular schedule and after large rainfall or snowmelt events. Corrective action would be taken as necessary. All Project facilities would be designed, operated, and maintained to minimize erosion potential, and permanent stormwater BMPs would be installed to control runoff. The permanent BMPs would be maintained for the life of the Project.
- Water use would be minimized by using solar panel washing methods that reduce the required amount of water, such as using robotic panel washing equipment.
- Washing of solar panels would be conducted using only water, with no surfactants or other chemicals added.

Recommended Mitigation Measures

EFSEC has identified the following additional and modified mitigation measures for the Project to avoid and/or minimize impacts on water resources.

W-1[16]: **Least Risk Fish Windows:** Project construction and decommissioning within ephemeral and intermittent streams would observe the least risk windows for spawning and incubating salmonoids, which are, conservatively, August 1 to September 15 for the Yakima and Columbia Rivers and their tributaries in Benton County (WDFW 2018). This mitigation measure addresses potential impacts on surface water and fish habitat and would minimize risk to aquatic species.

[16] W-: Identifier of numbered mitigation item for Water

W-2: Minimize Work in Heavy Rain: Project construction and decommissioning would be minimized during rainy periods and heavy rain—in particular, work near ephemeral or intermittent streams. This mitigation measure addresses potential impacts of surface water and runoff and would minimize the risk of sediment release to surface water and wetlands.

W-3: Check Dams: As indicated in Ecology (2019) BMP C207E, check dams cannot be placed or used in streams unless approved by WDFW. Check dams used for work within ephemeral or intermittent streams would be approved by EFSEC in coordination with WDFW and Ecology prior to use. Stream crossing designs and associated mitigation plans would be provided and approved by EFSEC in coordination with WDFW and Ecology. This mitigation measure addresses the use of check dams on site, which would require approval by WDFW and Ecology prior to use.

W-4: Culvert Installation BMPs: Based on the ASC, one culvert is proposed along one intermittent stream. Installation of the culvert would follow U.S. Department of Agriculture BMPs:

- Be oriented and aligned with the natural stream channel.
- Be constructed at or near natural elevation of the streambed to avoid or minimize potential flooding upstream of the crossing and erosion below the outlet.
- Use suitable measures to avoid or minimize water from seeping around the culvert.
- Use suitable measures to avoid or minimize culvert plugging from transported debris or bedload.
- Be regularly inspected and cleaned as necessary for the life of the Project (USDA 2012).
- Cover culvert with sufficient fill to avoid or minimize damage by traffic.
- Install culverts long enough to extend beyond the toe of the fill slopes to minimize erosion.

This mitigation measure addresses permanent impacts on ephemeral streams. It measure provides specifications on culvert installation to enable assessment of the potential impacts.

W-5: Employee Training: An employee training plan would be included as part of the SPCC Plan. For the duration of the Project, employees and workers on site would receive appropriate training according to the employee training plan to ensure that any spills are reported and responded to in an appropriate manner (Ecology 1999). This would include training on the use of spill response equipment and orientations identifying the location of hazardous materials, proper storage of hazardous materials, and location of spill response equipment to ensure that workers are competent in spill response. The mitigation measure addresses potential impacts on water quality including sedimentation and accidental spill. Employee training reduces the risk of human error and increases confidence in the effectiveness of spill response in the event of accidents such as an accidental spill.

W-6: Wetland SWPPP: A Stormwater Pollution Prevention Plan (SWPPP) would be designed specifically for work within the Micrositing Corridor adjacent to the wetland (Figure 3.4-1, Section 3.4). The SWPPP would include BMPs from the Stormwater Management Manual for Eastern Washington (Ecology 2019). The plan would include, but not be limited to, structural measures such as installation of silt fences and sediment ponds, and non-structural measures, including routine inspection and maintenance and enforcement of BMPs, to minimize surface water runoff generated from the construction activities to the wetland. The mitigation measure addresses potential impacts on the wetland situated near the Micrositing

Corridor. The wetland is located downgradient from the construction area, so additional mitigation is proposed to avoid impacts.

W-7: Clear-Span 100-Year Floodplain: Clear-span the transmission line to avoid temporary disturbance to the 100-year flood plain. Site transmission line poles outside the 100-year floodplain. The mitigation measure addresses physical disturbance of the 100-year floodplain, a CARA.

W-8: Spill Response Equipment: Spill response equipment would be stored in every vehicle accessing the site during construction, operation, and decommissioning. In addition, an oil pan would be placed below heavy equipment when stored or not in use on site. The mitigation measure addresses spill response impacts by specifying locations for spill response equipment.

W-9: Minimize Water Use: During construction, operation, and decommissioning, water use would be minimized where possible. During drought or water shortage, schedule adjustment would be considered to minimize water needs on the site, where possible, or additional alternate off-site water supplies would be identified. The mitigation measure addresses impacts on public water supply to minimize water use on site throughout the life of the Project.

W-10: Panel Washing: During drought or water shortage, panel washing would be postponed or alternate off-site water sources could be identified to minimize impacts on public water supply. Panel wash water would be recycled and re-used where possible during operations. The mitigation measure addresses impacts on public water supply to minimize water use on site from panel washing, if required.

4.4.4 Significant Unavoidable Adverse Impacts

Determining the significance of an impact involves context and intensity, which in turn depends on the magnitude and duration of an impact. “Significant” in the Washington State Environmental Policy Act means a reasonable likelihood of more than a moderate adverse impact on environmental quality. An impact may also be significant if its chance of occurrence is not great, but the resulting environmental impact would be severe if it occurred (Washington Administrative Code 197-11-794).

This Draft EIS weighs the impacts on water resources use that may result from the Proposed Action with mitigation and makes a resulting determination of significance for each impact in **Tables 4.4-4a, 4.4-4b, and 4.4-4c**.

Table 4.4-4a: Summary of Potential Impacts on Water Resources during Construction of the Proposed Action

Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Physical Disturbance	Turbine Option 1 Turbine Option 2 **Comprehensive Project**	Project construction would require temporary and permanent disturbance, which could impact surface water and wetlands, surface runoff/absorption, floodplains, and groundwater.	Low	Short Term (for temporary disturbance) Long Term (for permanent disturbance)	Unavoidable	Confined	**W-1:** Least Risk Fish Windows **W-2:** Minimize Work in Heavy Rain **W-3:** Check Dams **W-4:** Culvert Installation BMPs **W-6:** Wetland SWPPP **W-7:** Clear-span 100-Year Floodplain	None identified
Physical Disturbance	Solar Arrays	Project construction would require temporary and permanent disturbance, which could impact surface water and wetlands, surface runoff/absorption, floodplains, and groundwater.	Low	Short Term	Unavoidable	Confined	**W-1:** Least Risk Fish Windows **W-2:** Minimize Work in Heavy Rain **W-3:** Check Dams **W-4:** Culvert Installation BMPs **W-6:** Wetland SWPPP **W-7:** Clear-span 100-Year Floodplain	None identified
Physical Disturbance	BESSs Substations	Project construction would require temporary and permanent disturbance, which could impact surface water and wetlands, surface runoff/absorption, floodplains, and groundwater.	Low	Short Term (for temporary disturbance) Long Term (for permanent disturbance)	Unavoidable	Limited	**W-1:** Least Risk Fish Windows **W-2:** Minimize Work in Heavy Rain **W-3:** Check Dams **W-6:** Wetland SWPPP	None identified
Change in Water Quality	Turbine Option 1 Turbine Option 2 **Comprehensive Project**	Project construction could result in a change to water quality of waterways that intersect or are located adjacent to Project construction activities.	Low	Temporary	Unlikely	Local	**W-1:** Least Risk Fish Windows **W-2:** Minimize Work in Heavy Rain **W-3:** Check Dams **W-5** Employee Training **W-6:** Wetland SWPPP **W-8:** Spill Response Equipment	None identified
Change in Water Quality	Solar Arrays	Project construction activities could result in a change to water quality of waterways adjacent to Project construction activities.	Negligible	Temporary	Unlikely	Local	**W-1:** Least Risk Fish Windows **W-2:** Minimize Work in Heavy Rain **W-3:** Check Dams **W-5:** Employee Training **W-6:** Wetland SWPPP **W-8:** Spill Response Equipment	None identified
Change in Hydrology – Temporary Disturbance	Turbine Option 1 Turbine Option 2 **Comprehensive Project**	Temporary disturbance from Project construction within ephemeral and intermittent streams could result in changes to the hydrology of waterways.	Low	Short Term	Unlikely	Limited	**W-1:** Least Risk Fish Windows **W-2:** Minimize Work in Heavy Rain **W-3:** Check Dams **W-4:** Culvert Installation BMPs	None identified
Change in Hydrology – Permanent Disturbance	Turbine Option 1 Turbine Option 2 **Comprehensive Project**	Project construction would require a culvert installation on one intermittent stream that could result in changes to the hydrology of the stream.	Low	Long Term	Unavoidable	Limited	**W-1:** Least Risk Fish Windows **W-2:** Minimize Work in Heavy Rain **W-3:** Check Dams **W-4:** Culvert Installation BMPs	None identified
Introduction of Hazardous Substances	Turbine Option 1 Turbine Option 2 **Comprehensive Project**	Project construction could result in the introduction of hazardous substances that could impact surface water and wetlands, floodplains, and groundwater.	Low	Temporary	Unlikely	Local	**W-7:** Employee Training **W-8:** Spill Response Equipment	None identified

Table 4.4-4a: Summary of Potential Impacts on Water Resources during Construction of the Proposed Action

Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Introduction of Hazardous Substances	Solar Arrays BESSs Substations	Project construction could result in the introduction of hazardous substances that could impact surface water and wetlands, floodplains, and groundwater.	Negligible	Temporary	Unlikely	Limited	**W-3:** Concrete Wash-out Area **W-5:** Employee Training **W-8:** Spill Response Equipment	None identified
Public Water Supply	**Comprehensive Project**	Project construction activities would rely on water supplied by the City of Kennewick Public Works.	Medium	Temporary	Feasible	Regional	**W-9:** Minimize Water Use	None identified
Public Water Supply	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	Project construction activities would rely on water supplied by the City of Kennewick Public Works.	Low	Temporary	Feasible	Regional	**W-9:** Minimize Water Use	None identified

Notes:
[a] The impacts related to each component, including "comprehensive Project," were rated separately; components were combined in the same cell if they received the same impact ratings for the identified topic.
[b] Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.
[c] Mitigation measures listed here are additional actions that EFSEC could impose to further reduce the impacts. See Section 4.1 Introduction for details.
[d] Significant unavoidable impacts are those that would remain even after all identified additional mitigation measures have been required by EFSEC.
BESS = battery energy storage system; EFSEC = Washington Energy Site Evaluation Council

Table 4.4-4b: Summary of Potential Impacts on Water Resources during Operation of the Proposed Action

Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation©	Significant Unavoidable Adverse Impacts[d]
Panel Washing	Solar Arrays **Comprehensive Project**	Project operations would require water to wash solar array panels, which would infiltrate the surrounding ground and could impact water resources.	Negligible	Temporary	Unlikely	Confined	**W-9:** Minimize Water Use **W-10:** Panel Washing	None identified
Surface Water Runoff from Impervious Surfaces	Turbine Option 1 Turbine Option 2 **Comprehensive Project**	Project operations would increase impervious surfaces, which could lead to increased water runoff to water resources.	Low	Temporary	Unlikely	Local	No mitigation identified	None identified
Introduction of Hazardous Substances	Turbine Option 1 Turbine Option 2 **Comprehensive Project**	Project operations could result in the accidental release of hazardous substances that could impact water resources.	Negligible	Temporary	Unlikely	Limited	**W-5:** Employee Training **W-8:** Spill Response Equipment	None identified
Impacts on Public Water Supply	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Project operations would rely on water from public water supply for operations.	Low	Temporary	Feasible	Regional	**W-9:** Minimize Water Use **W-10:** Panel Washing	None identified

Notes:
(a) The impacts related to each component, including “comprehensive Project,” were rated separately; components were combined in the same cell if they received the same impact ratings for the identified topic.
(b) Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.
(c) Mitigation measures listed here are additional actions that EFSEC could impose to further reduce the impacts. See Section 4.1 Introduction for details.
(d) Significant unavoidable impacts are those that would remain even after all identified additional mitigation measures have been required by EFSEC.
EFSEC = Washington Energy Facility Siting Evaluation Council

Table 4.4-4c: Summary of Potential Impacts on Water Resources during Decommissioning of the Proposed Action

Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Physical Disturbance	Turbine Option 1 Turbine Option 2 Solar Arrays **Comprehensive Project**	Project decommissioning would result in physical disturbance that could impact surface water and wetlands, runoff and absorption capacity, floodplains, and groundwater resources.	Low	Short Term	Unavoidable	Confined	**W-1:** Least Risk Fish Windows **W-2:** Minimize Work in Heavy Rain **W-3:** Check Dams **W-6:** Wetland SWPPP	None identified
Physical Disturbance	BESSs Substations	Project decommissioning would result in physical disturbance that could impact surface water and wetlands, runoff and absorption capacity, floodplains, and groundwater resources.	Low	Short Term	Unavoidable	Limited	**W-1:** Least Risk Fish Windows **W-2:** Minimize Work in Heavy Rain **W-3:** Check Dams **W-6:** Wetland SWPPP	None identified
Change in Water Quality	Turbine Option 1 Turbine Option 2 **Comprehensive Project**	Project decommissioning would require temporary disturbance, which could impact water quality.	Low	Temporary	Unlikely	Local	**W-1:** Least Risk Fish Windows **W-2:** Minimize Work in Heavy Rain **W-3:** Check Dams **W-5:** Employee Training **W-6:** Wetland SWPPP **W-8:** Spill Response Equipment	None identified
Change in Water Quality	Solar Arrays	Project decommissioning would require temporary disturbance areas to access and remove Project components located near ephemeral and intermittent streams and could result in changes to water quality.	Negligible	Temporary	Unlikely	Local	**W-1:** Least Risk Fish Windows **W-2:** Minimize Work in Heavy Rain **W-3:** Check Dams **W-5:** Employee Training **W-6:** Wetland SWPPP **W-8:** Spill Response Equipment	None identified
Change in Hydrology	Turbine Option 1 Turbine Option 2 **Comprehensive Project**	Project decommissioning would require temporary disturbance to some ephemeral and intermittent streams but would restore the disturbance areas following decommissioning.	Low	Short Term	Unlikely	Limited	**W-3:** Check Dams	None identified
Introduction of Hazardous Substances	Turbine Option 1 Turbine Option 2 **Comprehensive Project**	Project decommissioning could result in the introduction of hazardous substances to water resources.	Low	Temporary	Unlikely	Local	**W-5:** Employee Training **W-8:** Spill Response Equipment	None identified
Introduction of Hazardous Substances	Solar Arrays BESSs Substations	Project decommissioning could result in the introduction of hazardous substances to water resources.	Negligible	Temporary	Unlikely	Limited	**W-5:** Employee Training **W-8:** Spill Response Equipment	None identified

Table 4.4-4c: Summary of Potential Impacts on Water Resources during Decommissioning of the Proposed Action

Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Impacts on Public Water Supply	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Project decommissioning could result in impacts on public water supply.	Low	Temporary	Unlikely	Regional	**W-9:** Minimize Water Use	None identified

Notes:
[a] The impacts related to each component, including “comprehensive Project,” were rated separately; components were combined in the same cell if they received the same impact ratings for the identified topic.
[b] Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.
[c] Mitigation measures listed here are additional actions that EFSEC could impose to further reduce the impacts. See Section 4.1 Introduction for details.
[d] Significant unavoidable impacts are those that would remain even after all identified additional mitigation measures have been required by EFSEC.
CARA = critical aquifer recharge area; EFSEC = Washington Energy Facility Siting Evaluation Council

4.4.5 Impacts of No Action Alternative

Under the No Action Alternative, impacts related to water resources from the construction, operation, and decommissioning of the Proposed Action would not occur. For the purpose of this analysis, it is assumed that no future development would occur within the Lease Boundary.

This Page Intentionally Left Blank

4.5 Vegetation

This section describes the potential impacts on vegetation resources identified in Section 3.5 that would result from the construction, operation, and decommissioning of the proposed Horse Heaven Wind Farm (Project, or Proposed Action) or under the No Action Alternative.

The qualitative evaluation presented herein relies on the impact scale defined in Section 4.1 and shown in **Table 4.5-1.** Acreage impacts presented in this section were calculated independently from the spatial data provided by Horse Heaven Wind Farm, LLC (Applicant).

Table 4.5-1: Impact Rating Table for Vegetation from Section 4.1

Factor	Rating →			
Magnitude	**Negligible** indistinguishable from the background	**Low** small impact, non-sensitive receptor(s)	**Medium** intermediate impact, may occur on sensitive receptor(s) or affect public health and safety	**High** large impact on sensitive receptor(s) or affecting public health and safety
Duration	**Temporary** infrequently during any stage	**Short Term** duration of construction or site restoration	**Long Term** during operation or operation plus another stage of Project	**Constant** during life of Project and/or beyond the Project
Likelihood	**Unlikely** not expected to occur	**Feasible** may occur	**Probable** expected to occur	**Unavoidable** inevitable
Spatial Extent/Setting	**Limited** small area of Lease Boundary or beyond Lease Boundary if duration is temporary	**Confined** within Lease Boundary	**Local** beyond Lease Boundary to neighboring receptors	**Regional** beyond neighboring receptors

Three vegetation resources are the focus of this assessment, as described below. The term ‘habitat’ is used below to describe ecosystems to be in alignment with the Washington Department of Fish and Wildlife’s (WDFW) terminology which uses the terms Priority Habitat (WDFW 2008, 2009) and the Application for Site Certification (ASC), which provided “habitat mapping” for the Lease Boundary.

- **Priority Habitat** - Designated by WDFW to conserve and protect identified ecosystems. Priority Habitat that may be impacted by the Project includes Eastside Steppe Priority Habitat and Shrub-steppe Priority Habitat. Habitat subtypes classified by the Applicant during field surveys considered Priority Habitat include the Eastside (interior) grassland, dwarf shrub-steppe, and sagebrush shrub-steppe. Priority Habitat has been assessed separately from other habitat because seven Priority Habitats have been identified for conservation and management by WDFW.

- **Other habitats** - Includes other vegetated areas that are not identified for conservation or management but still provide ecosystem functions such as intercepting water and sediment, contributing organic matter to soil, or providing habitat for plant species. Other habitats include the habitat subtypes rabbitbrush shrubland, non-native grassland, and planted grassland, which are not actively managed and have the potential to progress to natural ecosystems. While agriculture land may provide wildlife habitat, active vegetation management precludes it from being considered within the vegetation section. Developed and disturbed habitat subtype generally lacks vegetation and is therefore not considered a habitat for plants.
- **Potential loss of special status plant species and their habitat** - Considers known locations of special status plant species, habitat suitability mapping provided by the Applicant, and habitat descriptions available for special status plant species. A special status plant species is defined as a federally or state-listed endangered, threatened, or sensitive vascular, non-vascular, or lichen species.

Habitats provide ecosystem values and functions. To assess the magnitude of an impact on habitat, the impact must be considered within the context of the landscape. The detailed rating scale for magnitude of impacts on Priority Habitat, other habitat, and special status plant species is provided in **Table 4.5-2**.

It has been argued that there is a critical threshold at which habitat loss impacts a species' resilience, or ability to recover from a disturbance, even if it is an incremental change. Some theories propose that the reasons for this threshold are: 1) changes in the configuration of habitat affect species' ability to migrate; 2) smaller patches of habitat result in a greater amount of edge habitat, leading to habitat degradation; 3) and genetic effects become more pronounced in small populations (Swift and Hannon 2010). Studies vary widely in their conclusions regarding what the critical threshold for habitat loss may be and are dependent on the resilience of the species and habitat (Swift and Hannon 2010).

Priority Habitat is already rare within the Lease Boundary and may already be within the critical threshold for loss. Within their historic range, shrub-steppe ecosystems are estimated to be 80 percent lost or degraded (WDFW 2022). Evaluation of the magnitude of impact on Priority Habitat considered whether the impact could push Priority Habitat beyond the critical threshold for loss.

Incremental loss of agricultural land and developed/disturbed land is not considered an impact on vegetation resources. Loss of other habitat includes all other habitat except Priority Habitat (evaluated separately), agriculture land, and developed/disturbed areas. While these other habitats have been modified due to anthropogenic activities on site, they may provide suitable habitat for some native species to persist. To determine the magnitude of impact on other habitat, the impacts were evaluated to determine whether they would push the other habitat beyond a critical threshold for loss.

Table 4.5-2: Criteria for Assessing Magnitude of Impacts on Vegetation Resources

Magnitude of Impact	Description
Negligible	**Priority Habitat:** The Project would avoid impacts on Priority Habitat during siting, and degradation of Priority Habitat is not anticipated. **Other Habitat:** Impact on other habitat would be indistinguishable from existing conditions. **Special Status Plant Species:** The Project would avoid suitable or potentially suitable habitat for special status plant species.
Low	**Priority Habitat:** The Project would result in the loss of Priority Habitat, but impacts are not anticipated to alter the ecological function of the Priority Habitat. Project impacts would leave patches largely intact, with impacts concentrated on the edge, and no impact on the central core, of a Priority Habitat patch. Further degradation of habitat beyond the edges would not be anticipated. Impacts would be reversible with restoration and management. **Other Habitat:** The Project would result in loss of other habitat, but the incremental change is not anticipated to alter the composition or resilience of populations of native plants. Other habitat patches would remain connected through corridors. Increase in developed/disturbed areas would not alter the functionality of other habitat relative to existing conditions. **Special Status Plant Species:** The Project would be located in suitable habitat for special status plant species that are known to occur in the Vegetation Area of Analysis, but impacts occur in marginal habitat and avoid known populations.
Medium	**Priority Habitat:** The Project would result in a moderate loss of Priority Habitat, which may alter some ecological functions. Impacts would occur mainly on the edges of Priority Habitat patches. Further degradation of habitat would be expected and would result in a moderate degree of alteration **Other Habitat:** The Project would result in a moderate loss of other habitat, causing fragmentation, and could impact the persistence of native plants in some patches. An increase in developed/disturbed areas would be evident from existing conditions but is unlikely to alter ecological function. **Special Status Plant Species:** The Project would impact suitable habitat for plant species at risk known to occur in the Vegetation Area of Analysis.
High	**Priority Habitat:** The Project would result in a loss of core areas of Priority Habitat, resulting in loss of ecological functions and habitat fragmentation. Further degradation of habitat would be expected from edges and extend to the core resulting in a high degree of alteration. **Other Habitat:** The Project would result in conversion of core areas of other habitat (e.g., paving). Areas of other habitat would become fragmented within the landscape, minimizing the ability for plants to disperse. Increase in impermeable surfaces would be large relative to existing conditions. **Special Status Plant Species:** The Project would directly impact a known population of special status plant species, resulting in the potential loss of a known population.

For the purpose of this section, the spatial extent of limited and confined described in **Table 4.5-1** are defined as follows, where the area can be quantified and is proportional to impacts:

- **Limited:** small areas of the Lease Boundary defined as less than 100 acres
- **Confined:** to distinguish from limited, confined is defined as greater than 100 acres but less than the total area of the Lease Boundary

Impacts on special status plant species are rated local. Direct impacts of the loss of a subpopulation are considered confined to the Lease Boundary where disturbance is planned. However, loss of a subpopulation could result in indirect impacts at the local scale through loss of genetic diversity and vulnerability to stochastic events.

4.5.1 Method of Analysis

The study area for vegetation consists of the Lease Boundary and a 2-mile area around the Lease Boundary, referred to as the Vegetation Area of Analysis, which is consistent with the assessment area for Wildlife and Wildlife Habitat (Section 4.6).

Laws and regulations for determining potential impacts on vegetation are summarized in **Table 4.5-3**.

Table 4.5-3: Laws and Regulations for Vegetation Resources

Regulation, Statute, Guideline	Responsible Authority	Description
Federal		
Endangered Species Act of 1973	U.S. Fish and Wildlife Service National Marine Fisheries Service	Protects endangered and threatened species (including subspecies, varieties, and subpopulations) listed under the act and protects the ecosystems they rely on.
State		
Revised Code of Washington 16-750 Noxious Weeds – Control Boards	Washington State Noxious Weed Control Board	The purpose of this code is to minimize the economic loss and adverse effects of noxious weeds on Washington's agriculture, natural areas, and human resources. This code grants jurisdiction, powers, and duties to the county's noxious weed control boards.
Washington State Code 16-750 State Noxious Weed List and Schedule of Monetary Penalties	Washington State Noxious Weed Control Board	The purpose of this code is to identify the state's noxious weed list of plants considered highly destructive, competitive, or difficult to control. This code also provides a ranking of noxious weeds as Class A, Class B, or Class C, which indicates the requirements for control.
State of Washington Priority Habitat and Species List (WDFW 2008)	Washington Department of Fish and Wildlife	Priority Habitats are unique habitats or features that support biodiversity. WDFW maintains a catalog of Priority Habitats and species that are a priority for conservation and management. Priority Species require protection due to population trends, sensitivity to disturbance and habitat alteration, or importance to communities.
WDFW Wind Power Guidelines (WDFW 2009)	Washington Department of Fish and Wildlife	The purpose of the WDFW Wind Power Guidelines is to provide guidance for the development of wind energy facilities that avoid, minimize, and mitigate impacts on fish and wildlife habitats. WDFW provides reviews and recommendations to the permitting authority based on environmental expertise.
Local		
Benton County Code Title 15 Chapter 15.04 Wetlands	Benton County	All areas that meet the definition of a wetland in the Federal Wetlands Delineation Manual (i.e., are inundated or saturated with surface or groundwater to support hydrophilic vegetation) are designated critical areas. Wetlands are rated according to The Washington State Department of Ecology's Washington State Wetland Rating System for Eastern Washington – Revised. Activities allowed in wetlands are conservation and enhancement of the wetland.

Table 4.5-3: Laws and Regulations for Vegetation Resources

Regulation, Statute, Guideline	Responsible Authority	Description
Benton County Code – Title 15 Chapter 15.14 Fish and Wildlife Habitat Conservation Areas	Benton County	Fish and wildlife habitat conservation areas relevant to vegetation resources include: ▪ Areas where state or federal designated endangered, threatened, and sensitive species have a primary association ▪ State Priority Habitats and areas associated with state Priority Habitats ▪ Habitats and species of local importance, which includes shrub-steppe habitat in Benton County. Development on conservation areas is prohibited unless federal or state permits or approval is obtained.

The habitat mapping and electronic shapefiles provided by the Applicant were used to quantify the area of net change to vegetation due to the Project for each habitat type and disturbance type unless otherwise stated. All impacts on vegetation were also assessed qualitatively, following the methods outlined in Section 4.1.

4.5.2 Impacts of the Proposed Action

Potential impacts related to the turbines, solar arrays, battery energy storage systems (BESSs), and substations may be generalized when impacts are common within the Wind Energy Micrositing Corridor or Solar Siting Areas. Where impacts on vegetation are anticipated to differ, they are broken into individual Project components. This Draft Environmental Impact Statement describes potential impacts specific to each proposed turbine option (represented by Option 1 or 2), solar array, or BESS where this information was available in the ASC (Horse Heaven Wind Farm, LLC 2021a). For the purpose of the vegetation resources impact assessment, Project components considered are described below and acreages of impact associated with the components are presented in **Table 4.5-4**:

- **Wind Energy Micrositing Corridor**: The Micrositing Corridor includes the wind turbine towers, access roads, crane paths, laydown areas, operation and maintenance facilities, meteorological towers, collector lines, and transmission lines. Horse Heaven Wind Farm, LLC (Applicant) provided the areas of disturbance related to Turbine Option 1 but not for Turbine Option 2. Option 1 includes a greater number of turbines than Option 2. It is assumed that Option 2 would have the same or, potentially, fewer impacts on vegetation resources than Option 1. Therefore, only Option 1 is assessed.
- **Solar Siting Areas:** three Solar Siting Areas are proposed. Impacts from the Solar Siting Areas are further divided into the East Solar Field, County Well Solar Field, and Sellards Solar Field where impacts are anticipated to differ. The three Solar Siting Areas differ in size based on total acreage of impact. Impacts from the solar siting areas include areas under the solar arrays and within the permanent fence.
- **Substations:** Five substations are proposed. Each substation is anticipated to have the same impact on water resources, so one assessment is given that applies to all substations.
- **Battery Energy Storage Systems:** Three BESSs are proposed. Impacts on water resources from the BESSs are not anticipated to differ, so one assessment is given that applies to all BESSs.
- **Comprehensive Project:** The comprehensive Project includes combined impacts from all components.

Table 4.5-4: Acres of Assessment and Disturbance for Project Components

Area	Project Components Included	Total Assessment Area (acres)	Total Disturbance Area (acres)[(a)]
Micrositing Corridor	Turbine Option 1	11,845	3,356
	Turbine Option 2	11,845	NA
Solar Siting Area	East Solar Field	4,389	2,181
	County Well Solar Field	3,343	2,689
	Sellards Solar Field	3,023	2,022
Battery energy storage system (BESS)	BESS adjacent to Bofer Canyon – HH-East Substation	6	6
	BESS adjacent to the Primary HH-West Step-Up Substation	6	6
	BESS adjacent to the Alternate HH-West Step-Up Substation	6	6
Substations	HH-East Substation	10	10
	Primary HH-West Intermediate Substation	4	4
	Alternate HH-West Intermediate Substation	4	4
	Primary HH-West Step-Up Substation	10	10
	Alternate HH-West Step-Up Substation	10	10

Source: Calculations of areas were completed independently using spatial data provided by the Applicant (Horse Heaven Wind Farm, LLC 2021b).
Note:
(a) Includes both temporary and permanent disturbance.
NA = information not provided by the Applicant

The Wind Energy Micrositing Corridor includes the areas where turbine towers, access roads, crane paths, laydown areas, operations and maintenance facilities, meteorological towers, collector lines, and transmission lines would be developed. The ASC and the associated electronic shapefiles provided by the Applicant provide the area of disturbance related to Turbine Option 1 (Horse Heaven Wind Farm, LLC 2021b). Table 2.1-1 of Chapter 2.0, Proposed Action and Alternatives, illustrates that the temporary and permanent disturbance from turbine construction under Turbine Option 2 would be the same acreage of temporary and permanent disturbance as construction under Turbine Option 1. Turbine Option 1 would include a greater number of turbines than Turbine Option 2 and both would be sited within the same Micrositing Corridor footprint. Without the detailed design of disturbance areas for Option 2, it is assumed that the impacts from Option 2 would be similar to Option 1, and only Option 1 is assessed herein.

Impacts of the Proposed Action on vegetation resources are divided into two main categories: direct and indirect. Direct impacts result from an action that has an immediate impact on vegetation resources at the same time and place as the impact. Indirect impacts result from an action that may affect vegetation resources at a separate time or place from the initial impact. The identified impacts of the Project on vegetation resources are described below, with details provided in Sections 4.5.2.1 to 4.5.2.3.

Direct Impacts

For vegetation resources, direct impacts relate to the loss of a habitat for vegetation or a vegetative species. Assessments are provided for the loss of the extent of Priority Habitat, loss of the extent of other habitat, and loss of special status plant species.

Indirect Impacts

Degradation of Priority Habitat, other habitat, and suitable habitat for special status plant species refers to alterations of a habitat that negatively impact the plant species and ecosystem functions provided by that habitat. Degradation could occur from the following sources: introduction of hazardous substances, change in surface runoff, introduction or spread of invasive plants or noxious weeds, and deposition of dust.

Fragmentation of Priority Habitat, other habitat, and suitable habitat for special status plant species refers to impacts that further divide or separate vegetation resources. The Project could cause fragmentation of vegetation resources through the construction of roads and permanent disturbance, which could increase the risk of fire or edge effects.

4.5.2.1 Impacts during Construction

Project construction could result in both direct and indirect impacts on vegetation resources. This section describes the relationships between Project activities and their potential impacts. A summary of impact ratings is provided in **Table 4.5-12a.**

Direct Impacts

Direct impacts during construction of the Project includes the loss of habitat or vegetative species due to temporary or permanent disturbance.

Loss of Habitat and Special Status Plant Species

Site clearing associated with the construction of the Project would result in direct loss of acreage associated with Priority Habitat and other habitat. Loss of Priority Habitat and other habitat is further divided into two types:

- **Temporary disturbance** is defined as habitat loss that would end when construction is complete and the area would be restored to preconstruction conditions (WDFW 2009). Temporary disturbance from Project construction would occur in equipment laydown areas, construction staging areas, some roads, and areas required for construction that would not be part of the permanent infrastructure. These areas would be revegetated once construction is complete.

- **Permanent disturbance** is defined as habitat loss that would persist throughout the life of the Project and would not be restored when construction is complete (WDFW 2009). Permanent disturbance from Project construction (which extends into operation and decommissioning) would occur in the areas of the final tower footings and associated access roads, the substations, fencing around the solar arrays, and all areas occupied by permanent structures. Permanent disturbance also includes areas identified by the Applicant as modified habitat, which includes areas within the fencing around solar arrays. The areas under and between solar arrays would be disturbed during Project construction and would be replanted following construction; however, areas under the solar arrays would not be able to support certain plant species, including tall grasses, tall forbs, and shrubs. The areas under solar arrays would be planted with a mix of low-growing forbs and grasses (Horse Heaven Wind Farm, LLC 2021a). Modified habitat would extend from Project construction through to Project decommissioning, and therefore is included with permanent disturbance.

While no special status plant species were documented within the Lease Boundary (Section 3.5), the potential remains for species to be present within areas that would be required for Project construction. Special status plant species are vulnerable by nature due to specific habitat requirements, low populations, or limited habitat availability. The loss of a few individuals can have impacts on the population. The potential for impacts on special status plant species was assessed for the impact areas according to the following elements for each area:

- Type of habitat that would be impacted and that could support special status plant species
- Proximity to known locations of special status plant species

The comprehensive Project would result in approximately 9,821 acres of disturbance. Temporary and permanent disturbance were calculated independently using spatial data provided by the Applicant for the Wind Energy Micrositing Corridor, Solar Siting Areas, and comprehensive Project (Horse Heaven Wind Farm, LLC 2021b). The total acreage of each habitat subtype available within the Lease Boundary is also included for proportional analysis. To assess the impact on Priority Habitat, the proportion of Priority Habitat that would be lost by each Project component was calculated as a percentage of availability in the Lease Boundary. This was calculated by dividing the acres of disturbance within the Priority Habitat subtype from each Project component by the total Priority Habitat subtype available in the Lease Boundary. Acres of disturbance by habitat subtype can be found in **Table 4.5-5.**

Table 4.5-5: Total Acres of Habitat Types and Subtypes Identified by the Applicant for Temporary and Permanent Disturbance in the Wind Energy Micrositing Corridor, Solar Siting Areas, and Comprehensive Project in Comparison to Total Habitat Available in the Lease Boundary

Habitat Type	Wind Energy Micrositing Corridor (Turbine Option 1)		Solar Siting Areas		Comprehensive Project		Total Habitat Available in the Lease Boundary (acres)
	Temporary Disturbance (acres)	Permanent Disturbance (acres)	Temporary Disturbance (acres)	Permanent Disturbance[b] (acres)	Temporary Disturbance (acres)	Permanent Disturbance[b] (acres)	
Agriculture Land	2,263.9	391.2	200.6	5,589.5	2,323.9	5,802.8	53,450.1
Developed/disturbed	19.3	1.5	3.5	0.01	19.3	1.6	855.7
Grassland							
Eastside (Interior) Grassland (Eastside Steppe)[a]	15.3	5.4	7.9	72.5	16.2	72.5	173.5
Non-native grassland	136.0	11.5	3.2	24.7	137.3	36.1	1,635.5
Planted grassland	259.8	23.3	21.5	215.3	263.0	236.0	4,338.3
Unclassified grassland	0	0	0	0	0.01	0	6,125.2
Shrubland							
Dwarf shrub-steppe[a]	8.9	1.1	0	0	8.9	1.1	23.2
Rabbitbrush shrubland	145.0	41.6	43.8	706.1	152.3	717.2	3,037.7
Sagebrush shrub-steppe[a]	31.4	1.1	2.8	0.3	31.4	1.4	1,372.0
Unclassified shrubland	0	0	0	0	<0.01	0	1,436.6
Total	**2,879.6**	**476.7**	**283.3**	**6,608.41**	**2,952.32**	**6,868.7**	**72,427.8**

Source: Horse Heaven Wind Farm, LLC 2021b

Notes: Calculations of areas were completed independently using spatial data provided by the Applicant (Horse Heaven Wind Farm, LLC 2021b). Sum of the acres within disturbance areas of the Micrositing Corridor and Solar Siting Areas will not equal the comprehensive Project due to overlapping areas. Disturbance areas were only provided for Turbine Option 1. It is assumed that the area required for Turbine Option 2 is equal to or less than Turbine Option 1 (fewer turbines), so Turbine Option 1 presents the worst-case scenario.

(a) Washington State Department of Fish and Wildlife Priority Habitats

(b) Permanent disturbance includes the areas of permanent disturbance and modified habitats described by the Applicant. The modified habitats are areas under and between the solar arrays that would be planted with low-growing native grass and forbs; the vegetation will be restricted to only low-growing species because of the solar arrays.

Table 4.5-6 provides the acreages by habitat subtype for each Solar Siting Area that would be disturbed during Project construction as either temporary disturbance or permanent disturbance. Differences in impacts would be anticipated among the three Solar Siting Areas due to differential impacts on Priority Habitat, so they are assessed individually. A summary of the impacts that construction within the Solar Siting Areas could have on Priority Habitat, other habitat, and special status plant species is provided below. Because Priority Habitats are considered more likely to provide suitable habitat for special status plant species, the assessment is expected to differ among the Solar Siting Areas.

For all Solar Siting Areas, modified habitat, which is accounted for as part of the permanent disturbance, is assessed as a long-term impact because the vegetation under and between the solar arrays would remain “modified” for the duration of the Project. Low-growing grasses and forbs would be planted under the solar arrays following construction, which may offer some habitat for certain species; however, the modified habitat would not be conducive to shrubs and tall grasses (Horse Heaven Wind Farm, LLC 2021a). In addition, shading and runoff from solar panels could create altered microhabitats in the areas under and adjacent to the panels (Tanner et al. 2020). Some native plants may not be able to survive in these conditions, or the introduction of greater moisture may facilitate the growth of invasive plants. Furthermore, the area would be fenced and would not be accessible to some wildlife species (Horse Heaven Wind Farm, LLC 2021a).

Loss of other habitat is provided as the total acres of loss and as a percentage for each Project component. Other habitats include the subtypes non-native grassland, planted grassland, rabbitbrush shrubland, unclassified grassland, and unclassified shrubland. To determine the percent loss of other habitat, the temporary and permanent disturbance acres were divided by the total availability of other habitat within the Lease Boundary. A summary of the percentage of temporary and permanent disturbance that would result from each Project component to other habitat is provided in **Table 4.5-7**.

Table 4.5-6: Habitat Types and Subtypes in the Solar Siting Areas

Habitat Type	East Solar Field		County Well Solar Field		Sellards Solar Field	
	Temporary Disturbance (acres)	Permanent Disturbance[b] (acres)	Temporary Disturbance (acres)	Permanent Disturbance[b] (acres)	Temporary Disturbance (acres)	Permanent Disturbance[b] (acres)
Agriculture Land	85.6	1,075.1	30.0	2,580.4	85.0	1,934.0
Developed/Disturbed	2.7	<0.01	0.2	0	0.6	0
Grassland						
Eastside (Interior) Grassland[a]	7.9	72.5	0	0	0	0
Non-native Grassland	2.9	21.6	0.1	3.0	0.2	0
Planted Grassland	19.8	140.3	1.3	73.7	0.4	1.2
Shrubland						
Dwarf Shrub-steppe[a]	0	0	0	0	0	0
Rabbitbrush Shrubland	43.8	706.1	0	0	0	0
Sagebrush Shrub-steppe[a]	2.5	0.3	0	0	0.3	0
Total	**165.2**	**2,015.9**	**31.6**	**2,657.1**	**86.5**	**1,935.2**

Source: Horse Heaven Wind Farm, LLC 2021b

Notes: Calculations of areas were completed independently using spatial data provided by the Applicant (Horse Heaven Wind Farm, LLC 2021b).

(a) Washington State Department of Fish and Wildlife Priority Habitats

(b) Permanent disturbance includes the areas of permanent disturbance and modified habitat described by the Applicant. The modified habitats are areas under and between the solar arrays (i.e., within the fence line) that would be planted with low-growing native grass and forbs; the vegetation would be restricted to only low growing species because of the solar array.

Table 4.5-7: Percent Impact of Other Habitat Types by Project Component for Temporary and Permanent Disturbance

Project Component	Temporary Disturbance (acres)	Temporary Disturbance (% Loss)[(a)]	Permanent Disturbance (acres)	Permanent Disturbance (% Loss)[(a)]
Turbine Option 1 and Option 2	540.8	3.3 %	76.4	0.5 %
East Solar Field	66.5	0.4 %	868	5.2 %
County Well Solar Field	1.4	<0.1 %	76.7	0.5 %
Sellards Solar Field	0.6	<0.1 %	1.2	<0.1 %
BESS	0	0 %	0	0 %
Substations	0.1	<0.1 %	1.6	<0.1 %
Comprehensive Project	552.6	3.3 %	989.3	6.0 %

Source: Horse Heaven Wind Farm, LLC 2021b
Notes: Calculations of areas were completed independently using spatial data provided by the Applicant (Horse Heaven Wind Farm, LLC 2021b). The sum of all project components does not equal the comprehensive Project due to overlapping areas among Project components.
(a) Percentage of other habitat types impacted from Project components were calculated by dividing the sum of temporary or permanent disturbance from each Project component by the availability in the Lease Boundary. Other habitats include non-native grassland, planted grassland, rabbitbrush shrubland, unclassified grassland, and unclassified shrubland. Calculations of habitat areas were completed independently using spatial files provided by the Applicant

Indirect Impacts

Indirect impacts are classified into two categories: habitat degradation and habitat fragmentation.

Habitat Degradation

Introduction of Hazardous Substance

The introduction of hazardous substances to the environment could occur in the event of an accidental spill, which could impact vegetation in multiple ways. Hazardous substances identified by the Applicant that may be stored or used during construction or operation of the Project include synthetic lubricating oil, glycol-water mix, transformer mineral oil, hydraulic fluid, and diesel fuel. Hazardous substances could cause direct mortality, loss of vigor, and increased susceptibility to pathogens in plants. Impacts could be long term if soil chemistry is altered. During Project construction, the introduction of hazardous substances would be associated with the following activities:

- Refueling vehicles and equipment (e.g., oil, diesel fuel)
- Vehicle and equipment maintenance (e.g., oil leak)
- Concrete-mixing for foundations and pads

These construction activities would be required for all Project components.

Surface Runoff

Surface runoff from areas disturbed by the Project (i.e., exposed soil) could contain suspended soils, which could impact soil quality and vegetation. Low levels of sedimentation are not expected to impact vegetation resources; however, high sedimentation levels have the potential to influence the physical and chemical parameters of soil, which may impact ecosystem function and vegetation quality in habitat adjacent to the Project. Sedimentation can reduce photosynthesis and repress the growth of plants. In addition, the Project is anticipated to increase the area of impermeable surfaces in the Lease Boundary, which may increase surface runoff. During construction, surface runoff would be associated with the following activities:

- Clearing and grading the site
- Excavating soil
- Stockpiling soil
- Constructing site roads, laydowns, turnaround areas, and crane pads
- Constructing the foundations for turbine posts and solar array tracking system
- Areas in early stages of revegetation following disturbance

These construction activities would be required for all Project components. It is not anticipated that any of the Project components would have a greater impact on vegetation from surface runoff, relative to each other.

Introduction or Spread of Invasive Plants or Noxious Weeds

Project construction could introduce or spread invasive plants or noxious weeds. Invasive plants and noxious weeds have been documented throughout the Lease Boundary and are described in Section 3.5. Invasive plants are often pioneering species with highly competitive traits and readily establish on exposed soil. The primary vectors that could introduce or spread invasive plants and noxious weeds are vehicles and equipment. Invasive species have the potential to alter the chemical and physical properties of soil, as well as nutrient cycling (Weidenhamer and Callaway 2010), which can alter the structure and composition of native vegetation. Within shrub-steppe ecosystems, fragmentation of vegetation communities by linear features such as roads and transmission lines have created conditions that facilitate the spread of invasive species (Knick et al. 2003). Project construction would result in the following linear features, some of which would be located in Priority Habitat (Horse Heaven Wind Farm, LLC 2021a):

- 107.3 miles of permanent roads and 107.3 miles of temporary roads for new access roads and meteorological tower roads
- 33.6 miles of temporary crane paths
- 19.9 miles of temporary disturbance for transmission lines
- 103 miles of permanent disturbance for underground collector lines and 285.4 miles of temporary disturbance for underground collector lines

Construction of all Project components could introduce or spread invasive plants and noxious weeds. The assessment of impacts from the introduction or spread of invasive plants or noxious weeds is provided in **Table 4.5-12a**. Introduction and spread of invasive plants or noxious weeds would be minimized through the implementation of the Noxious Weed Control Plan (Appendix N, Horse Heaven Wind Farm, LLC 2021a) and the mitigation measures proposed in the ASC.

Deposition of Dust

Project construction could increase ambient dust from site preparation and clearing activities, which would then be deposited in the surrounding vegetation. Dust deposition could affect the quality and quantity of vegetation adjacent to construction areas. Dust can coat vegetation and cause adverse effects on vegetation growth, block stomata, reduce photosynthesis, and affect plant vigor (Farmer 1991).

Dust from Project construction could be generated during site preparation, excavating, and concrete works and from increased vehicle and equipment access on roads. In addition, vehicles and equipment accessing the site on gravel roads could generate dust. Vehicles would require access in subsequent stages for operations and maintenance and Project decommissioning. These activities would be applicable to all Project components. It is anticipated that all Project components would have approximately equivalent impacts from dust generation. The assessment of impacts for the deposition of dust is provided for the following Project components and Project component areas: Wind Energy Micrositing Corridor, Solar Siting Areas, substations, and BESSs (**Table 4.5-12a**).

Habitat Fragmentation

Fire

Project construction could increase the risk of fire, particularly during hot, dry conditions. Wildfires have become more commonly human-caused than natural (WDFW 2011). As described in Section 3.13.2, Benton County has a high potential for wildfire. Activities associated with construction that could increase the risk of fire include brush clearing, improper vehicle or equipment staging, and improper storage of flammable products, such as diesel for vehicles. In addition, workers on site could accidentally cause a fire in dry conditions, such as through improper disposal of cigarettes. Certain species within the Lease Boundary may further increase the risk—e.g., cheatgrass, a common invasive plant in the area. Relative to native vegetation, cheatgrass dries earlier in the season and can change fire intensity levels and fire return intervals and lengthen wildfire risk beyond the natural season (WDFW 2011).

Impacts from fire on individual plants include tissue damage and mortality. Plant species vary in their tolerance to fire. Rabbitbrush (*Chrysothamnus viscidiflorus*) is a fire-tolerant species and readily sprouts post-fire. Conversely, big sagebrush (*Artemisia tridentata*) is a fire-intolerant species and is slow to recover following wildfire events (USGS 2018). Big sagebrush is an indicator species for sagebrush shrub-steppe, while high cover of rabbitbrush represents an early seral stage of shrubland. Decreased time intervals between fire events may limit the re-establishment of later successional species such as big sagebrush.

At a larger scale, fire could impact and alter vegetation communities in combination with other indirect effects. While fire is a natural component of the ecosystem, it may be detrimental in areas of fragmented native ecosystems. Where shrub-steppe and native grasslands are fragmented, fire could burn through the remnant patch. Given the landscape, there is limited adjacent shrub-steppe habitat within the Lease Boundary or Vegetation Area of Analysis to provide a source of seeds for natural revegetation. Fires in warm and dry climates, where adjacent seed sources are lacking, recover slowly and may require seeding (USGS 2018). Areas affected by fire may provide opportunities for invasive plants to establish or spread before native vegetation has recovered, particularly where invasive plants are already common on the landscape.

In addition, vegetation and detritus intercept water before it reaches the soil, which helps slow water contacting soil and enables greater infiltration (Moench and Fusaro 2012). Plant roots also help to anchor soil in place, but, once dead, plant roots no longer provide this ecosystem function. If a fire impacts a large area of vegetation, there could be greater exposed soil and increased risk of water mobilizing sediments into streams and other water sources, resulting in sedimentation.

Turbine Option 1 and Option 2

A summary of the impacts that construction within the Wind Energy Micrositing Corridor (Turbine Option 1 or Option 2) could have on habitat and special status plant species is provided below (Horse Heaven Wind Farm, LLC 2021a; Tetra Tech 2021). Areas of temporary and permanent disturbance were provided by the Applicant for Turbine Option 1 but have not been provided for Turbine Option 2. Turbine Option 1 includes a greater number of wind turbines and access roads. As the detailed design for the Project is not complete, the disturbance areas for Turbine Option 1 were assessed for both Turbine Option 1 and Option 2 as a worst-case scenario.

Direct Impacts

Direct impacts during construction of the turbines include the loss of extent of Priority Habitat, other habitat, and special status species.

Loss of Extent of Priority Habitat

The temporary disturbance and permanent disturbance of Priority Habitat are provided in **Table 4.5-8**.

Table 4.5-8: Loss of Extent of Priority Habitat - Micrositing Corridor

	Temporary Disturbance (acres)	Temporary Disturbance (percent of total disturbance)	Permanent Disturbance (acres)	Temporary Disturbance (percent of total disturbance)
Eastside (interior) grassland[(a)]	15.3	9 %	5.4	3 %
Dwarf shrub-steppe[(b)]	8.9	38 %	1.1	5 %
Sagebrush shrub-steppe[(b)]	31.4	2 %	1.1	<1 %

Source: Calculations of areas were completed independently using spatial data provided by the Applicant (Horse Heaven Wind Farm, LLC 2021b).
Notes:
(a) Part of the Eastside Steppe Priority Habitat
(b) A subtype of Shrub-steppe Priority Habitat
N/A = not applicable

Loss of extent of Priority Habitat is rated high magnitude for temporary disturbance as there would be greater than 10 acres of impact on Priority Habitat and greater than 20 percent of impact for dwarf shrub-steppe Priority Habitat. A total of 38 percent (8.9 acres) of dwarf shrub-steppe habitat subtypes known to occur in the Lease Boundary would occur within temporary disturbance areas identified for the Micrositing Corridor. A total of 9 percent (15.3 acres) of Eastside (interior) grassland would occur in temporary disturbance areas for the Micrositing Corridor. This degree of loss could impact the ecological functions provided by the Priority Habitat. Infrastructure such as wind turbines and roads would impact the core of some habitat patches and result in habitat fragmentation. The duration of loss of extent of Priority Habitat is rated as short term for temporary disturbance, as revegetation would occur following construction. The likelihood is rated as unavoidable because the Applicant has identified these areas as temporary and permanent disturbance areas that would be required for Project construction. The spatial extent would be less than 100 acres, and so is rated as limited within the Lease Boundary.

Loss of extent of Priority Habitat is rated low magnitude for permanent disturbance. Less than 10 acres of Priority Habitat is proposed to be permanently disturbed. Permanent disturbance is mainly concentrated around Priority Habitat edges, except permanent disturbance within the dwarf shrub-steppe Priority Habitat, which may impact some core habitat. The duration of loss of extent of Priority Habitat is rated as long term for permanent disturbance, as habitats in these areas would be lost from construction through to decommissioning but would be revegetated following decommissioning. The likelihood is rated as unavoidable because the Applicant has identified these areas as temporary and permanent disturbances that would be required for Project construction. The spatial extent would be less than 100 acres and is rated as limited within the Lease Boundary.

Loss of Extent of Other Habitat

Loss of extent of other habitat is rated low magnitude for temporary disturbance as construction would temporarily impact 3.3 percent of other habitat in the Lease Boundary. The duration is rated as short term for temporary disturbance. The likelihood is rated unavoidable because the Applicant has identified these areas would be required for Project construction. The spatial extent would be greater than 100 acres so is rated confined within the Lease Boundary.

Loss of extent of other habitat is rated negligible magnitude for permanent disturbance as construction would permanently impact less than 1 percent of other habitat in the Lease Boundary. The duration is rated long term for permanent disturbance. The likelihood is rated as unavoidable because the Applicant has identified these areas would be required for Project construction. The spatial extent would be less than 100 acres, so is rated limited within the Lease Boundary.

Loss of Extent of Special Status Plant Species

While the majority of the area within the Micrositing Corridor is classified as agriculture, all three Priority Habitats known to occur within the Lease Boundary would be impacted within the Micrositing Corridor. Priority Habitats contain native vegetation with varying degrees of disturbance. Special status species associated with Shrub-steppe Priority Habitat and Eastside Steppe Priority Habitat would have increased potential for occurring where the Micrositing Corridor overlaps with the Priority Habitats.

The habitat suitability mapping for woven spore lichen (*Texosporium sancti-jacobi*) provided by the Applicant identified 18.9 acres of potentially suitable habitat within the Micrositing Corridor, and four occurrences of the lichen are known to occur within 3 miles of the Lease Boundary (Tetra Tech 2021). The nearest known location of woven spore lichen is located within 0.6 miles north of the Micrositing Corridor.

A summary of the impact ratings is provided in **Table 4.5-12a**. Loss of extent of special status species is rated medium magnitude as impacts would occur in 18.9 acres of suitable habitat for woven spore lichen. Impacts are anticipated to be at least partially reversible with restoration. The duration is rated as constant, from construction through to decommissioning, and could extend beyond the life of the Project as populations of special status plant species would be difficult to recover if lost. The likelihood is rated as feasible, as special status species have not been documented, but suitable habitat occurs. In addition, surveys did not document lichens or non-vascular plants. The spatial extent of the impact is local as impacts on a special status plant species or population may affect the local population beyond the Lease Boundary. Because special status plant species are vulnerable by nature, additional impacts such as loss of a subpopulation could cause population-level impacts through reduced genetic diversity and reduced resilience to stochastic events, among other factors.

Indirect Impacts

Indirect impacts are classified into two categories: habitat degradation and habitat fragmentation.

Habitat Degradation

The potential exists for habitat degradation to occur during the construction of the turbines. Commitments proposed by the Applicant would meet state and county requirements for best practices, but habitat degradation could occur in the form of the introduction of hazardous substances, the potential for surface runoff, the introduction or spread of invasive plants and noxious weeds, and the deposition of dust.

Accidental spills related to the construction of the Project would be small in scale and would be originating from a point source of either equipment or vehicles. The development of a Spill Response Plan would minimize the risk of spills and spill response material would be available on site.

Surface runoff is not anticipated to exceed greater than 100 acres. Vegetation resources are expected to recover easily following removal of the source of surface runoff. The development of the Stormwater Pollution Prevention Plan (SWPPP) and Erosion and Temporary Erosion and Sediment Control Plan (TESC Plan) would minimize the risk of surface runoff.

Noxious weeds and invasive plants are already common in the Micrositing Corridor, which would provide a continuous source for weeds to establish. Noxious weeds and invasive plants typically require multiple years of treatment and monitoring to control. There is a high likelihood that equipment would encounter invasive plants on site during the construction of the turbines. This could result in spreading invasive plants to work areas through soil or plant propagules, even with best practices and mitigation. In addition, the Noxious Weed Control Plan would only include treatment and monitoring for noxious weeds, not all invasive plants. Invasive plants and noxious weeds could spread beyond the initial occurrence, including the Lease Boundary, and often have traits that facilitate their dispersal and colonization.

There would be a small increase in dust-generating activities that could impact adjacent vegetation during the construction of the turbines. The arid environment increases the potential for dust-generating activities. Dust generated from the Project could be spread beyond the Lease Boundary by wind or water.

The magnitude of habitat degradation during the construction of the turbines is rated as low as sources are likely to be point sources and would not affect sensitive receptors. Habitat degradation is rated as having a long-term duration due to the potential for this impact to occur throughout the construction stage and for treatment and monitoring to last into operation of the Project. The likelihood is rated as feasible due to the nature of the activities, and the spatial extent would be local because the impact would have the potential to occur beyond the Lease Boundary.

Habitat Fragmentation

The impact of fire on vegetation resources is rated low magnitude because most Project activities would not have a high risk of causing fire. However, turbine construction may pose a risk due to the combustible materials and lubricants in the nacelle and from diesel-powered generators that may be required. The duration is rated long term as ecosystem recovery from a fire could take several years. The likelihood is rated as feasible for the Micrositing Corridor with the application of Best Management Practices (BMPs). Combustible materials would be required during the construction of the turbines. The nacelle of turbines contains combustible materials and lubricants that may pose a risk to fire, and diesel-powered generators may be required during turbine commissioning. The spatial extent is local as fire, under the right conditions (e.g., wind and heat), could move across the landscape rapidly and have the potential to impact areas beyond the Lease Boundary.

Solar Siting Areas

Impacts from the Solar Siting Areas are assessed as direct and indirect impacts. The assessment is further divided where impacts on vegetation resources would differ between each solar field.

Direct Impacts

Direct impacts during construction of the solar arrays include the loss of extent of Priority Habitat, other habitat, and special status species for each solar field.

Loss of Extent of Priority Habitat

East Solar Field

As referenced in **Table 4.5-6**, loss of extent of Priority Habitat within the East Solar Field would impact Eastside (interior) grassland and sagebrush shrub-steppe. Disturbance related to construction would temporarily impact 4.6 percent (7.9 acres) of Eastside (interior) grassland available within the Lease Boundary and permanently impact 41.7 percent (72.5 acres). Construction of the East Solar Field would temporarily impact less than 0.1 percent (2.5 acres) of sagebrush shrub-steppe available within the Lease Boundary and permanently impact less than 0.1 percent (0.3 acres).

A summary of the impact ratings is provided in **Table 4.5-12a**. Impacts related to loss of extent of Priority Habitat from construction are rated medium for temporary disturbance. Temporary disturbance is greater than 10 acres but would primarily impact the edge of Priority Habitat. Impacts are expected to be partially reversible with revegetation; however, shrubs and tall grasses may not be feasible to plant within the solar array area. The duration is rated as short term for temporary disturbance. The likelihood is rated as unavoidable for both permanent and temporary disturbance because the Applicant has identified these areas as disturbance areas required for Project construction. The spatial extent is rated limited based on the total area of disturbance to Priority Habitat.

Impacts related to loss of extent of Priority Habitat from construction of the East Solar Field are rated high magnitude for permanent disturbance. Permanent disturbance in the East Solar Field would impact 41.7 percent of Eastside (interior) grassland, including loss of the core area in the patch, available in the Lease Boundary. Impacts may not be fully reversible. The duration is rated long term for permanent disturbance and modified habitat. The likelihood is rated unavoidable because the Applicant has identified permanent disturbance areas that would be required for Project construction. The spatial extent is rated limited based on the total area of permanent disturbance to Priority Habitat.

County Well Solar Field

No Priority Habitat is mapped in the County Well Solar Field.

A summary of the impact ratings is provided in **Table 4.5-12a**. Impacts from construction of the County Well Solar Field on loss of extent of Priority Habitat is rated negligible magnitude for temporary and permanent disturbance as there would be no impacts on Priority Habitat. The duration is rated short term for temporary disturbance and long term for permanent disturbance and modified habitat. The likelihood is rated as unlikely for temporary and permanent disturbance. The spatial extent is rated as limited within the Lease Boundary for temporary and permanent disturbance.

Sellards Solar Field

As referenced in **Table 4.5-6**, loss of extent of Priority Habitat within the Sellards Solar Field would impact sagebrush shrub-steppe. Disturbance related to construction would temporarily impact less than 0.1 percent (0.3 acres) of sagebrush shrub-steppe within the Lease Boundary.

Impacts related to loss of extent of Priority Habitat from construction of the Sellards Solar Field are rated low magnitude for temporary disturbance, as there would be less than 1 acre of disturbance to Priority Habitat, and this is expected to be reversible. Adjustments during construction could avoid or further minimize the impacts on Priority Habitat. The duration is rated short term for temporary disturbance. The likelihood is rated as feasible for temporary disturbance. While the area has been identified, final siting could seek avoidance of the small area of Priority Habitat. The spatial extent is rated as limited for all disturbance types.

Impacts on Priority Habitat from permanent disturbance are rated as negligible magnitude because no impacts Priority Habitats would occur in these disturbance areas. The duration is rated long term for permanent disturbance. The likelihood is rated as unlikely for permanent disturbance as there would be no impacts on Priority Habitats. The spatial extent is rated as limited for all disturbance types.

Loss of Extent of Other Habitat

East Solar Field

Impacts related to loss of extent of other habitat from construction of the East Solar Field are rated negligible for temporary disturbance. Temporary disturbance would occur to less than 1 percent of other habitat. The duration is rated as short term for temporary disturbance. The likelihood is rated as unavoidable because the Applicant has identified these areas would be required for Project construction. The spatial extent is rated as limited for temporary disturbance.

Impacts related to loss of extent of other habitat from construction of the East Solar Field are rated low magnitude for permanent disturbance. Permanent disturbance would occur to 5.2 percent of other habitat, including rabbitbrush shrubland. Modified habitat would be planted under the solar arrays, but only low-growing grasses and forbs can be planted. The structural complexity provided by the rabbitbrush shrubland would be lost from construction through to decommissioning. The duration is rated long term for permanent disturbance. The likelihood is rated as unavoidable because the Applicant has identified these areas would be required for Project construction. The spatial extent is rated confined for permanent disturbance.

County Well Solar Field

The magnitude of impact from construction of the County Well Solar Field related to loss of extent of other habitat is rated negligible for temporary and permanent disturbance as there would be less than 1 percent disturbance to other habitat for both disturbance types. The duration is rated as short term for temporary disturbance and long term for permanent disturbance. The likelihood is rated as unavoidable for temporary and permanent disturbance because the Applicant has identified these areas would be required for Project construction. The spatial extent is rated as limited.

Sellards Solar Field

Impacts related to loss of extent of other habitats from construction of the Sellards Solar Field are rated negligible magnitude for temporary and permanent disturbance. Impacts from temporary disturbance are rated short term and impacts from permanent disturbance are rated long term. The likelihood is rated as unavoidable for temporary and permanent disturbance because the Applicant has identified these areas would be required for Project construction. The spatial extent is rated as limited.

Loss of Extent of Special Status Plant Species

East Solar Field

No special status plant species have been identified in the East Solar Field; however, Priority Habitat within the East Solar Field has the potential to support some special status plant species. No suitable habitat for woven spore lichen has been identified.

A summary of the impact ratings is provided in **Table 4.5-12a**. Impacts on special status species from construction of the East Solar Field are rated medium magnitude as there would be a potential to impact special status species. While no species were documented within the East Solar Field, Priority Habitats within the East Solar Field have increased potential to support special status plants. Impacts on Eastside (interior) grassland and shrub-steppe are anticipated to be partially reversible with the establishment of modified habitat but may lack the structural complexity of tall grasses and shrubs. The duration of impacts is rated as constant during the life of the Project and/or beyond the Project. Special status species are often limited in distribution, have low tolerance of disturbance, and/or are associated with unique features. If impacted, there is a low likelihood that the population would recover. The likelihood of impacts is rated as unlikely as special status species have not been documented within the Lease Boundary. The spatial extent of the impacts is rated local.

County Well Solar Field

Habitat types within the County Well Solar Field include agriculture, developed/disturbed, planted grassland, and non-native grassland. These habitat types have a high degree of disturbance and non-native species. Special status plant species are not anticipated to occur in these habitats.

The magnitude of impact on special status plant species from construction of the County Well Solar Field is rated negligible. Special status plant species are not expected to occur because they have not been documented during surveys and there is no suitable habitat within the County Well Solar Field disturbance areas. The duration of impact is rated constant. The likelihood is rated as unlikely as there is no suitable habitat, and the spatial extent is rated local.

Sellards Solar Field

No special status plant species have been identified in the Sellards Solar Field; however, Priority Habitat within the Sellards Solar Field has the potential to support special status plant species.

Impacts on special status species from construction of the Sellards Solar Field are rated low magnitude as there would be some potential to impact special status species. No special status plant species have been documented, but there is less than 1 acre of Priority Habitat that would occur within disturbance areas of Sellards Solar Field, which is considered potential suitable habitat. The magnitude of impacts is rated low. Adjustments during construction could avoid impacts on Priority Habitat, which could reduce the magnitude. The duration is rated as constant. The likelihood of impacts is rated as unlikely as special status species have not been documented within the Lease Boundary. The spatial extent of the impacts is rated local.

Indirect Impacts

Indirect impacts are classified into two categories: habitat degradation and habitat fragmentation.

Habitat Degradation (All Solar Siting Areas)

The potential exists for habitat degradation to occur during the construction of the solar arrays. Habitat degradation could occur in the form of the introduction of hazardous substances, the potential for surface runoff, the introduction or spread of invasive plants and noxious weeds, and the deposition of dust. The magnitude for the potential for habitat degradation is rated low. The duration is rated as long term due to the potential for some effects from the impacts to last longer than the construction stage of the Project. The likelihood is rated as feasible due to the Applicant's commitments and the additional mitigation measures presented, and the spatial extent is rated local to address the potential for impacts to affect areas past the Lease Boundary.

Habitat Fragmentation (All Solar Siting Areas)

Similar to the construction of the turbines, the magnitude for the potential of fire impacts is rated low, the duration is rated long term, and the spatial extent is local. The likelihood is rated as unlikely. Construction of solar arrays would not require the use of combustible materials.

Battery Energy Storage Systems

No differences in impacts are anticipated among the three proposed locations, and the three BESSs are rated together in **Table 4.5-12a** (i.e., not broken out as individual BESS).

Direct Impacts

Direct impacts during construction of the BESSs include the loss of extent of Priority Habitat, other habitat, and special status species.

Loss of Extent of Priority Habitat

No impacts on Priority Habitat would occur within the disturbance areas for the BESSs.

A summary of the impact ratings is provided in **Table 4.5-12a**. Impacts resulting in loss of extent of Priority Habitat from construction of the BESSs are rated negligible magnitude for temporary and permanent disturbance. The duration is rated short term for temporary disturbance and long term for permanent disturbance. The likelihood is rated as unlikely, and the spatial extent is rated as limited for both temporary and permanent disturbance.

Loss of Extent of Other Habitat

All three BESSs would be situated on approximately 6.0 acres of agriculture land each (Section 3.5).

Impacts resulting in loss of extent of other habitat from construction of the BESSs are rated negligible magnitude for temporary and permanent disturbance as impacts on other habitat would not occur. The duration of impact for temporary disturbance would be short term, and long term for permanent disturbance. Temporary and permanent disturbance are rated as unlikely as other habitat would not be impacted due to Project siting of the BESS. The spatial extent is rated as limited.

Loss of Extent of Special Status Plant Species

The BESSs are all sited in areas characterized as agriculture land. No suitable habitat for special status plant species occurs within these areas.

A summary of impact ratings is provided in **Table 4.5-12a.** The magnitude of impact of construction of the BESSs on special status plant species is rated negligible. The duration is rated constant. The likelihood is rated as unlikely, and the spatial extent is local.

Indirect Impacts

Indirect impacts are classified into two categories: habitat degradation and habitat fragmentation.

Habitat Degradation

The construction of the BESSs has the potential to introduce hazardous substances, surface runoff, new or increased spread of invasive plants, and deposition of dust. As with the construction of the turbines, habitat degradation during the construction of the BESS is rated low, long-term, feasible, and local.

Habitat Fragmentation

Similar to the construction of the Solar Siting Areas, the magnitude of fire impacts for the construction of the BESSs is rated low, the duration is rated long term, the likelihood is rated as unlikely, and the spatial extent is local.

Substations

No differences in impacts are anticipated among the five proposed locations, and the five substations are rated together in **Table 4.5-12a** (i.e., not broken out as individual substations).

Direct Impacts

Direct impacts during construction of the substations includes the loss of extent of Priority Habitat, other habitat, and special status species.

Loss of Extent of Priority Habitat

No impacts on Priority Habitat would occur within any of the proposed substation locations.

A summary of the impact ratings is provided in **Table 4.5-12a**. The magnitude of impacts from construction of the substations related to loss of Priority Habitat is rated negligible as there are no Priority Habitats known to occur in these areas. The duration is rated as short term for temporary disturbance and long term for permanent disturbance. The likelihood is rated as unlikely as there are no known Priority Habitats. The spatial extent is rated as limited.

Loss of Extent of Other Habitat

Temporary and permanent disturbance areas by substation are provided in **Table 4.5-9**.

Table 4.5-9: Temporary and Permanent Disturbance Acres by Substation

Substation	Habitat Subtype	Temporary Disturbance (acres)[a]	Permanent Disturbance (acres)[b]
HH-East Substation	Agriculture Land	0.4	10
Primary HH-West Step-up Substation	Agriculture Land	1.0	10
Alternate HH-West Step-up Substation	Agriculture Land	0.6	10
Alternate HH-West Intermediate Substation	Agriculture Land	0.4	4
Primary HH-West Substation	Agriculture Land	0.3	2.4
Primary HH-West Substation	Non-native grassland	0.1	1.6

Source: Calculations of areas were completed independently using spatial data provided by the Applicant (Horse Heaven Wind Farm, LLC 2021b).
Notes:
(a) Temporary disturbance areas include the perimeter of the substation. Temporary disturbance are approximate values based on the spatial files.
(b) Permanent disturbance areas include the area required for the substation.

Impacts of the substations related to loss of extent of other habitats are rated negligible magnitude for temporary and permanent disturbance as less than 1 percent of other habitat available in the Lease Boundary would be impacted. Only the Primary HH-West Substation will impact other habitat as shown in **Table 4.5-9.** The duration of impacts for temporary disturbance would be short term, and long term for permanent disturbance. This impact is rated as unavoidable as the disturbance areas would be required for construction, as indicated by the ASC. The impact is rated as limited as the substations occupy approximately 4 or 10 acres each, which constitutes a small area within the Lease Boundary.

Loss of Extent of Special Status Plant Species

The substations are all sited in areas characterized as agriculture land and/or non-native grassland. No suitable habitat for special status plant species occurs within these areas.

Impacts on special status plant species are summarized in **Table 4.5-12a.** The magnitude of impact from construction of the substations is rated negligible as there is no suitable habitat within the proposed disturbance areas for the substations. The duration is rated constant. The likelihood is rated as unlikely, and the spatial extent is local.

Indirect Impacts

Indirect impacts are classified into two categories: habitat degradation and habitat fragmentation.

Habitat Degradation

The construction of the substations has the potential to introduce hazardous substances, surface runoff, new or increased spread of invasive plants, and deposition of dust. As with the construction of the turbines, habitat degradation during the construction of the substations is rated as low, long-term, feasible, and local.

Habitat Fragmentation

Similar to the Solar Siting Areas, the magnitude of fire impacts for the construction of the substations is rated low, the duration is rated long term, the likelihood is rated as unlikely, and the spatial extent is local.

Comprehensive Project

Impacts from construction of the comprehensive Project consider all Project component together.

Direct Impacts

Direct impacts during construction of the Project includes the loss of extent of Priority Habitat, other habitat, and special status species.

Loss of Extent of Priority Habitat

The combined impacts from the comprehensive Project would result in direct impacts on Priority Habitat. The proportion of Priority Habitat impacted is based on the proportion of Priority Habitat disturbed compared to the total available in the Lease Boundary. The total habitat available in the Lease Boundary is presented in **Table 4.5-5**.

Impacts on Eastside (interior) grassland include 16.2 acres of temporary disturbance and 72.5 acres of permanent disturbance, which constitutes 51.1 percent of the Eastside (interior) grassland within the Lease Boundary.

Impacts on dwarf shrub-steppe include 8.9 acres of temporary disturbance and 1.1 acres of permanent disturbance, which constitutes 43.1 percent of the dwarf shrub-steppe habitat within the Lease Boundary.

Impacts on sagebrush shrub-steppe include 31.3 acres of temporary disturbance and 1.4 acre of permanent disturbance, which constitutes 3.1 percent of the sagebrush shrub-steppe habitat within the Lease Boundary.

A summary of the impact ratings is provided in **Table 4.5-12a**. Impacts from all Project components related to the loss of extent of Priority Habitat are rated as high magnitude for temporary disturbance and permanent disturbance. Impacts on Priority Habitat would be greater than 20 acres for both temporary and permanent disturbance. Impacts would occur in the core area within patches of Priority Habitat and are anticipated to lead to further habitat degradation, which may alter ecological function. The duration of impacts for temporary disturbance is rated short term, and long term for permanent disturbance. Revegetation of the site is proposed for temporary disturbance after construction following the Revegetation Plan (Appendix N; Horse Heaven Wind Farm, LLC 2021a) and site restoration would occur following decommissioning (Appendix A; Horse Heaven Wind Fam, LLC 2021a). The impacts are rated as unavoidable for temporary and permanent disturbance because the areas would be required for Project construction. The impacts are rated as limited within the Lease Boundary.

Loss of Extent of Other Habitat

Impacts from all Project components on the loss of extent of other habitat are rated as low magnitude for temporary and permanent disturbance. Temporary disturbance would result in approximately 3.3 percent loss of other habitat, and permanent disturbance would result in approximately 6.0 percent loss. The duration of impacts would be short term for temporary disturbance, and long term for permanent disturbance and modified habitat. The impacts are rated as unavoidable for temporary and permanent disturbance as the areas would be required for Project construction. The impacts are rated as confined as impacts from temporary and permanent disturbance would be greater than 100 acres each.

Loss of Extent of Special Status Plant Species

No special status species were observed within any of the areas where Project components are sited; however, Priority Habitat has the potential to support special status species. In addition, 18.9 acres of potentially suitable habitat for woven spore lichen occurs in the Micrositing Corridor (Tetra Tech 2021).

A summary of the impact ratings is provided in **Table 4.5-12a.** Impacts from all Project components resulting in the loss of extent of special status species are rated as medium for magnitude as there could be impacts on special status species. The duration of the impact is rated constant as populations of special status species would be difficult to recover if lost. The impact is rated as feasible because there is suitable habitat within areas identified for impact. The impact is rated as local because impacts would occur within the Lease Boundary.

Indirect Impacts

Habitat Degradation

The construction of the Project has the potential to introduce hazardous substances, surface runoff, new or increased spread of invasive plants, and deposition of dust. As with the construction of the turbines, habitat degradation during the construction of the comprehensive Project is rated as low, long-term, feasible, and local.

Habitat Fragmentation

Similar to the construction of the turbines, the magnitude of fire impacts for the construction of the comprehensive Project is rated low, the duration is rated long term, the likelihood is rated as feasible, and the spatial extent is local.

4.5.2.2 Impacts during Operation

Impacts on vegetation during Project operation are described below as they relate to Turbine Option 1, Turbine Option 2, Solar Siting Areas, BESSs, substations, and the comprehensive Project. A summary of the impact assessment is provided in **Table 4.5-12b.**

Direct Impacts

Direct impacts during Project operations include potential loss during vegetation maintenance.

Vegetation Maintenance

During operation, vegetation maintenance would be required for the Project, primarily under the solar arrays. Following construction, low-growing grasses and forbs would be seeded under the solar arrays (Horse Heaven Wind Farm, LLC 2021a). Limited information is provided in the ASC regarding vegetation maintenance activities during operation. However, it is anticipated that some vegetation maintenance may be required in order to remove shrubs, tall grasses, and tall forbs that may establish under the solar arrays. Maintenance would be limited to trimming and removing plants and may also include removing tumbleweeds from fences. Additional vegetation maintenance may be required along and adjacent to roads.

Vegetation maintenance would have a direct impact on vegetation resources. The magnitude of the impact is rated negligible. While some vegetation maintenance may be required for general operations, it is anticipated to be limited to areas of permanent disturbance and modified habitat. In addition, planting low-growing grasses and forbs in areas of modified habitat would minimize the amount of vegetation maintenance required. The duration is rated long term as maintenance would be required throughout operations. The likelihood is rated probable, and the spatial extent is rated limited for the substations and BESSs and confined for all other Project components, including the Comprehensive Project.

Indirect Impacts

Indirect impacts during Project operation would include habitat degradation and habitat fragmentation.

Habitat Degradation

Introduction of Hazardous Substances

Hazardous substances would continue to be stored on site during Project operation. Hazardous substances that would be required for the Project include synthetic lubricating oil, glycol-water mix, transformer mineral oil, hydraulic fluid, and diesel fuel. Impacts of hazardous substances are described in Section 4.5.2.1 and are applicable to Project operations.

Activities during Project operations that could cause the accidental spill or release of hazardous substances include refueling, maintenance of wind turbines, solar arrays, BESSs, and substations. Mitigation measures including a Spill Prevention, Control, and Countermeasures Plan and accessible spill kits, which would minimize the impacts of a spill on vegetation resources.

Introduction and Spread of Invasive Plants and Noxious Weeds

Project operation activities would have the potential to cause the introduction and spread of invasive plants and noxious weeds. During operation, maintenance vehicles would be required to access all Project components. Vehicles could carry soil or plant propagules that could introduce or spread invasive plants or noxious weeds.

The Applicant would monitor construction sites that have been revegetated for a minimum of three years post-construction (Appendix N, Horse Heaven Wind Farm, LLC 2021a). Treatment of noxious weeds on site would focus on the areas of temporary and permanent disturbance but would extend to adjacent areas where noxious weeds may have been spread if landowners agree to treatment. BMPs, such as vehicle cleaning, would minimize the introduction and spread of invasive plants and noxious weeds.

Deposition of Dust

As discussed in Section 4.5.2.1, the potential for dust deposition would continue into Project operation. Vehicles accessing the site to perform routine maintenance may generate dust from gravel roads that extends to adjacent vegetation.

Habitat Fragmentation

Edge Effects

The landscape within the Lease Boundary would be altered relative to existing conditions during Project operations. Major changes would include the increase in road networks and other linear features, increase in permanent structures, and increased use by humans. While vegetation is not affected by noise and sensory disturbance, effects from increased development can result in “edge effects.”

Edge effects are changes in ecological conditions due to the meeting of two or more different habitat types, which causes the habitats to impact one another. In the case of the Project, edge effects would occur when there is an increase in developed areas that border on natural areas. Edge effects can exacerbate other indirect impacts. For example, the Project would increase the number of roads within the Lease Boundary. Road networks and other transportation corridors can alter adjacent vegetation communities. Invasive plants spread through transportation corridors, and in grassland environments, the effects can extend to 150 meters (492 feet) from roads (Hansen and Clevenger 2005). Similarly, dust can extend up to 40 meters (131 feet) from roads (Gleason et al. 2007). Development, in particular linear features, that bisect natural areas result in habitat fragmentation and could continuously degrade adjacent habitat throughout the life of the Project. Mitigation such as noxious weed control and dust control could minimize the impacts.

Access to all Project infrastructure would be needed, so edge effects could impact all Project components. Magnitude is rated medium for the Wind Energy Micrositing Corridor and Solar Siting Areas as edge effects could extend into sensitive receptors. In addition, the newly built roads would cause fragmentation of the central core of some patches of Priority Habitat (e.g., where the Micrositing Corridor divides dwarf shrub-steppe Priority Habitat). The magnitude of impact is rated negligible for the BESSs and substations. Duration of the impacts is rated long term as impacts would continue through operation. The likelihood is feasible. The spatial extent is rated local for the Micrositing Corridor and Solar Siting Areas as the impact could extend beyond the Lease Boundary. The spatial extent is rated limited for the BESSs and substations.

Fire

The impacts of fire are discussed in Section 4.5.2.1. Project operation activities that have the potential to increase the risk of fire include improper vehicle or equipment staging, and improper storage of flammable products, such as diesel for vehicles. In addition, workers on site could accidentally cause a fire in dry conditions—for example, through improper disposal of cigarettes.

The impacts of fire are rated low magnitude because Project operation presents little increased risk of fire from operation activities. The duration is rated long term as ecosystem recovery from a fire could take several years. The likelihood is rated as unlikely with the application of mitigation. The spatial extent is local as fire, under the right conditions (e.g., wind and heat), could move across a landscape rapidly and have the potential to impact areas adjacent to the Lease Boundary.

Turbine Option 1 and Option 2

Assessment ratings of impacts from Turbine Option 2 are the same as Turbine Option 1.

Direct Impacts

Direct impacts during operation of the turbines include potential loss during vegetation maintenance.

Vegetation Maintenance

The magnitude of the impact for vegetation maintenance is rated negligible. Minor vegetation maintenance may be required along gravel roads or within concrete turbine foundations to maintain permanent access, these areas are considered areas of permanent disturbance. Vegetation maintenance beyond these features would not be anticipated. The duration is rated long term as maintenance would be required throughout operation. The likelihood is rated probable because vegetation is capable of colonizing on gravel roads but may present a hazard that requires removal. The spatial extent is rated confined as vegetation maintenance for turbines would occur in areas associated with permanent disturbance along the Micrositing Corridor.

Indirect Impacts

Indirect impacts during operation of the turbines would include habitat degradation and habitat fragmentation.

Habitat Degradation

The potential exists for habitat degradation to occur during the operation of the turbines. Habitat degradation could occur in the form of the introduction of hazardous substances, the introduction or spread of invasive plants and noxious weeds, and the deposition of dust. Mitigation measures would be consistent with state and county requirements and spill response equipment would be available on site.

Although noxious weeds and invasive plants are already common on the landscape, existing noxious weeds or noxious weeds introduced during the construction stage of the Project, would require several years of treatment and monitoring. While there would be no additional clearing during operations, vehicles and equipment would require site access for routine maintenance, which could present the potential for introduction and spread. The Noxious Weed Prevention and Control Plan (Appendix N, Horse Heaven Wind Farm, LLC 2021a) would be implemented during operation. Noxious weeds can spread beyond the initial occurrence and often have traits that facilitate their dispersal and colonization.

Dust sources would be restricted to the vehicles accessing the site for operations. Continual use of roads could cause dust deposition throughout the Project during operation. Dust generated from the Project could be spread beyond the Lease Boundary by wind or water.

The magnitude of habitat degradation is rated as low as sources are likely to be point sources and would not affect sensitive receptors. Habitat degradation is rated as having a long-term duration due to the potential for this impact to occur throughout the operation stage. The likelihood is rated as feasible due to nature of the activities, and the spatial extent would be local because the impact would have the potential to occur beyond the Lease Boundary.

Habitat Fragmentation

Habitat fragmentation during the operation of the turbines could include edge effects or increased fire risks.

The newly built roads would cause fragmentation of the central core of some patches of Priority Habitat (e.g., where the Micrositing Corridor divides dwarf shrub-steppe Priority Habitat).

Project operation presents little increased risk of fire from operation activities, however, ecosystem recovery from a fire could take several years. Fire, under the right conditions (e.g., wind and heat), could move across a landscape rapidly and have the potential to impact areas adjacent to the Lease Boundary.

The magnitude of habitat fragmentation is rated as low as some impacts may result but are not anticipated to alter the ecological conditions from present conditions. Habitat fragmentation is rated as having a long-term duration due to the potential for this impact to occur throughout the operation stage. The likelihood is rated as feasible, and the spatial extent would be local because the impact would have the potential to occur beyond the Lease Boundary.

Solar Siting Areas

Impacts from the Solar Siting Areas are assessed as direct and indirect impacts. The assessment is not further divided by solar field as the impacts are not anticipated to differ.

Direct Impacts

Direct impacts during operation of the solar arrays include potential loss during vegetation maintenance.

Vegetation Maintenance

Similar to the operation of the turbines, the magnitude of the impact is rated negligible. The duration is rated long term. The likelihood is rated probable, and the spatial extent is rated confined.

Indirect Impacts

Indirect impacts during operation of the solar arrays would include habitat degradation and habitat fragmentation.

Habitat Degradation

Habitat degradation could occur in the form of the introduction of hazardous substances, the introduction or spread of invasive plants and noxious weeds, and the deposition of dust. Mitigation measures would be consistent with state and county requirements and spill response equipment would be available on site. Identically rated to the operation of turbines, habitat degradation during the operation of Solar Siting Areas is rated low, long-term, feasible, and local.

Habitat Fragmentation

Habitat fragmentation during the operation of Solar Siting Areas could include edge effects and fire. Identically rated to the operation of turbines, habitat fragmentation during the operations of Solar Siting Areas is rated as low, long-term, feasible, and local.

Battery Energy Storage Systems

No differences in impacts are anticipated among the three proposed locations, and the three BESSs are rated together in **Table 4.5-12b** (i.e., not broken out as individual BESS).

Direct Impacts

Direct impacts during operation of the BESSs include potential loss during vegetation maintenance.

Vegetation Maintenance

Similar to the operation of the turbines, the magnitude of the impact is rated negligible. The duration is rated long term. The likelihood is rated probable, and the spatial extent is rated limited.

Indirect Impacts

Indirect impacts during operation of the BESSs would include habitat degradation and habitat fragmentation.

Habitat Degradation

Habitat degradation could occur in the form of the introduction of hazardous substances, the introduction or spread of invasive plants and noxious weeds, and the deposition of dust. Mitigation measures would be consistent with state and county requirements and spill response equipment would be available on site. Identically rated to the operation of turbines, habitat degradation during the operation of the BESS is rated low, long-term, feasible, and local.

Habitat Fragmentation

Habitat fragmentation during the operation of Solar Siting Areas could include edge effects and fire. The magnitude is rated negligible to low. The BESSs are small in size and do not interact with Priority Habitat. The duration is rated long term as the impact could occur throughout operations. The likelihood is rated as feasible. Lithium-ion battery storage may pose a risk of fire due to the tendency for lithium-ion batteries to overheat. The spatial extent is local.

Substations

No differences in impacts are anticipated among the five proposed locations, and the five substations are rated together in **Table 4.5-12b** (i.e., not broken out as individual substations).

Direct Impacts

Direct impacts during operation of the substations include potential loss during vegetation maintenance.

Vegetation Maintenance

Similar to the operation of the turbines, the magnitude of the impact is rated negligible. The duration is rated long term. The likelihood is rated probable, and the spatial extent is rated limited.

Indirect Impacts

Indirect impacts during operation of the substations would include habitat degradation and habitat fragmentation.

Habitat Degradation

Habitat degradation could occur in the form of the introduction of hazardous substances, the introduction or spread of invasive plants and noxious weeds, and the deposition of dust. Mitigation measures would be consistent with state and county requirements and spill response equipment would be available on site. Identically rated to the operation of turbines, habitat degradation during the operation of substations is rated low, long-term, feasible, and local.

Habitat Fragmentation

Habitat fragmentation during the operation of Solar Siting Areas could include edge effects and fire. Habitat fragmentation is rated low for the substations. The duration is rated long-term. The likelihood is rated unlikely, and spatial extent is local.

Comprehensive Project

Impacts from operations of the comprehensive Project consider all Project components together.

Direct Impacts

Direct impacts during the Project's operation include potential loss during vegetation maintenance.

Vegetation Maintenance

For the comprehensive Project, the magnitude of the impact is rated negligible. The duration is rated long term as maintenance would be required throughout operations. The likelihood is rated probable, and the spatial extent is rated confined.

Indirect Impacts

Indirect impacts are classified into two categories: habitat degradation and habitat fragmentation.

Habitat Degradation

Habitat degradation could occur in the form of the introduction of hazardous substances, the introduction or spread of invasive plants and noxious weeds, and the deposition of dust. Mitigation measures would be consistent with state and county requirements and spill response equipment would be available on site. Identically rated to the operation of turbines, habitat degradation during the operation of the comprehensive Project is rated low, long-term, feasible, and local.

Habitat Fragmentation

Habitat fragmentation during the operation of Solar Siting Areas could include edge effects and fire. The magnitude is rated as low, as the sum of all Project components would result in greater habitat fragmentation. The duration is rated long-term. The likelihood is rated feasible, and the spatial extent is rated local.

4.5.2.3 Impacts during Decommissioning

Impacts associated with decommissioning would be similar to impacts identified for Project construction (Section 4.5.2.1). Indirect impacts associated with Project decommissioning would be the same as during Project construction. Impact descriptions are provided in Section 4.5.2.1, and impact ratings from decommissioning are provided below. A summary of all impact ratings from decommissioning is provided in **Table 4.5-12c**.

Direct Impacts

Loss of Extent of Priority Habitat

Similar to construction, areas of temporary disturbance would be required in order to remove Project components. It is anticipated that the area of disturbance to Priority Habitat required during decommissioning would be similar to that required during construction. However, the areas of permanent disturbance from construction would have remained disturbed from Project construction, and therefore no additional disturbance would be required. Modified habitat associated with the Solar Siting Areas would also be temporarily lost during Project decommissioning. A summary of the areas of temporary disturbance that would be impacted during Project decommissioning, based on existing conditions, is provided in **Table 4.5-10**. Modified habitat is not included in the habitat breakdown as it would not be the same habitat as existing conditions but is assumed to be a mix of low-growing grasses and forbs (no Priority Habitat). A summary of the assessment rating for Project components is provided in **Table 4.5-12c**.

Table 4.5-10: Areas of Temporary Disturbance Required for Project Decommissioning

Habitat Type	Micrositing Corridor Temporary Disturbance (acres)	East Solar Field Temporary Disturbance (acres)	County Well Solar Field Temporary Disturbance (acres)	Sellards Solar Field Temporary Disturbance (acres)
Agriculture Land	2,269	85.6	30.0	85.0
Developed/Disturbed	21	2.7	0.2	0.6
Grassland				
Eastside (Interior) Grassland[(a)]	15	7.9	0	0
Non-native Grassland	136	2.9	0.1	0.2
Planted Grassland	259	19.8	1.3	0.4
Shrubland				
Dwarf Shrub-steppe[(a)]	9	0	0	0
Rabbitbrush Shrubland	141	43.8	0	0
Sagebrush shrub-steppe[(a)]	31	2.5	0	0.3
Total	**2,881**	**165.2**	**31.6**	**86.5**

Source: Calculations of areas were completed independently using spatial data provided by the Applicant (Horse Heaven Wind Farm, LLC 2021b).
Note: It is assumed that the areas of temporary disturbance required for Project construction would also be required for Project decommissioning.

Loss of Extent of Other Habitat

Similar to construction, areas of temporary disturbance would be required in order to remove Project components. It is anticipated that the area of disturbance required during decommissioning would be similar to that required during construction, except for permanent disturbance, which would have remained from Project construction. Modified habitat associated with the Solar Siting Areas would also be temporarily lost during Project decommissioning. Revegetation of the modified habitat may not have returned to the condition of modified habitat, once the solar arrays are removed. The final plan for revegetation following decommissioning has not been prepared, but it is assumed this would be agreed upon with the landowner. A summary of the areas of temporary disturbance that would be impacted during Project decommissioning, based on existing conditions, is provided in **Table 4.5-10**. Modified habitat is assumed to consist entirely of low-growing grasses and forbs. A summary of the assessment rating for Project components is provided in **Table 4.5-12c.**

Loss of Extent of Special Status Plant Species

Areas of temporary disturbance and modified habitat assumed to be impacted during Project decommissioning would have been previously impacted during Project construction. No special status species have been documented within the Lease Boundary; however, there is still potential for special status species to occur. The likelihood of occurrence for special status species would be less during decommissioning than during construction due to the previous disturbance that would have occurred during the Project construction activities. For example, woven spore lichen is known to occur in the Vegetation Area of Analysis. Woven spore lichen grows on soil and decaying bunchgrasses (Stone et al. 2020). Research has found this special status species is less resilient than other curst lichens, has a slower recovery time following disturbance, and, in some cases, may not recover following disturbance (Stone et al. 2020). Despite no direct impact during operations, persistent edge effects from Project infrastructure such as roads throughout the life of the Project would limit the likelihood of special status plants re-establishing. Increased frequency of invasive plants has been found as far as 150 meters (approximately 492 feet) from roads in grasslands relative to control (Hansen and Gleason 2005). Invasive plants would degrade the habitat and might outcompete or prevent the re-establishment of special status plants. All other assessment criteria would be the same as discussed in Section 4.5.2.1 for each Project component and Project component area.

An assessment of the direct impacts on vegetation resources during Project decommissioning is provided in **Table 4.5-12c**.

Turbine Option 1 and Option 2

Assessment ratings of impacts from Turbine Option 2 are the same as Turbine Option 1.

Direct Impacts

Direct impacts during decommissioning of the turbines include the loss of extent of Priority Habitat, other habitat, and special status species.

Loss of Extent of Priority Habitat

Magnitude for loss of extent of Priority Habitat is rated high for temporary disturbance because greater than 20 acres would be temporarily disturbed for decommissioning. The duration is short term as revegetation would occur following disturbance. The likelihood is rated as unavoidable, and the extent is rated as limited.

Loss of Extent of Other Habitat

Magnitude for loss of other habitats is rated low for temporary disturbance as 3.3 percent of other habitat in the Lease Boundary would be temporarily disturbed for decommissioning. The duration is rated short term. The likelihood is rated as unavoidable, and the spatial extent would be confined.

Loss of Extent of Special Status Plant Species

Magnitude for loss of extent of special status plant species is rated low. The duration of loss of extent of special status plant species is rated constant. The likelihood is rated as unlikely, and the spatial extent is local.

Indirect Impacts

Indirect impacts are classified into two categories: habitat degradation and habitat fragmentation.

Habitat Degradation

The potential exists for habitat degradation to occur during the decommissioning of the turbines. Commitments proposed by the Applicant would meet state and county requirements for best practices, but habitat degradation could occur in the form of the introduction of hazardous substances, the potential for surface runoff, the introduction or spread of invasive plants and noxious weeds, and the deposition of dust.

Accidental spills related to the decommissioning of the Project would be small in scale and would be originating from a point source of either equipment or vehicles. The development of a Spill Response Plan would minimize the risk of spills and spill response material would be available on site.

Surface runoff is not anticipated to exceed greater than 100 acres. Vegetation resources are expected to recover following removal of the source of surface runoff. The development of the SWPPP and TESC Plan would minimize the risk of surface runoff.

Noxious weeds and invasive plants are already common in the Micrositing Corridor, which would provide a continuous source for weeds to establish. Noxious weeds and invasive plants typically require multiple years of treatment and monitoring to control. There is a high likelihood that equipment would encounter invasive plants on site during the decommissioning of the turbines. This could result in spreading invasive plants to work areas through soil or plant propagules, even with best practices and mitigation. Implementation of a Noxious Weed Control Plan during decommissioning would reduce the potential for impacts. Invasive plants and noxious weeds could spread beyond the initial occurrence, including the Lease Boundary, and often have traits that facilitate their dispersal and colonization.

There would be a small increase in dust-generating activities that could impact adjacent vegetation during the decommissioning of the turbines. The arid environment increases the potential for dust-generating activities. Dust generated from the Project could be spread beyond the Lease Boundary by wind or water.

The magnitude of habitat degradation during the decommissioning of the turbines is rated as low as sources are likely to be point sources and would not affect sensitive receptors. Habitat degradation is rated as having a long-term duration due to the potential for this impact to occur throughout the decommissioning stage and beyond the life of the Project. The likelihood is rated as feasible due to the nature of the activities, and the spatial extent would be local because the impact would have the potential to occur beyond the Lease Boundary.

Habitat Fragmentation

Project decommissioning of the turbines has the potential to result in habitat fragmentation in the form of fire risk. The magnitude of the impact on vegetation resources is rated low because most Project activities would not have a high risk of causing fire and vegetation could recover following a fire. The duration is rated long term as ecosystem recovery from a fire could take several years. The likelihood is rated as feasible with the application of BMPs. During decommissioning, turbine towers would require disassembly, which could require hot works. The spatial extent is local as fire, under the right conditions (e.g., wind and heat), could move across a landscape rapidly and have the potential to impact areas adjacent to the Lease Boundary.

Solar Siting Areas

Direct Impacts

Direct impacts during decommissioning of the solar arrays include the loss of extent of Priority Habitat, other habitat, and special status species.

Loss of Extent of Priority Habitat

East Solar Field: Impacts from temporary disturbance on Priority Habitat are rated medium in magnitude because approximately 10.4 acres of Priority Habitat could be temporarily disturbed during decommissioning. The duration is rated short term because revegetation would occur following decommissioning. The likelihood is rated as unavoidable, and the spatial extent is rated limited.

County Well Solar Field: Loss of Priority Habitat from temporary disturbance for the County Well Solar Field is rated negligible for magnitude because no Priority Habitat would be disturbed. The duration is short term because revegetation would occur following decommissioning. The likelihood is rated as unlikely because no Priority Habitat is known to occur in temporary disturbance areas, and the spatial extent is rated as limited.

Sellards Solar Field: Loss of Priority Habitat for Sellards Solar Field is rated low magnitude for temporary disturbance because there are 0.3 acres of Sagebrush Shrub-steppe Priority Habitat within temporary disturbance areas. The duration is short term. The likelihood is rated as feasible for temporary disturbance and further minimization or avoidance could be achieved during decommissioning. The spatial extent is rated as limited.

Loss of Extent of Other Habitat (All Solar Siting Areas)

Impacts of temporary disturbance on other habitat for all Solar Siting Areas are rated negligible in magnitude. The duration is rated short term. The likelihood is rated as unavoidable, and the spatial extent is rated as limited.

Loss of Extent of Special Status Plant Species

East Solar Field: Magnitude is rated low for loss of extent of special status plant species. No special status plant species have been observed during field surveys and areas of temporary disturbance would have been disturbed during construction reducing the likelihood of special status plant species occurring. However, Priority Habitat would be temporarily disturbed. The duration is rated constant. The likelihood is rated as unlikely, and the spatial extent is rated local.

County Well Solar Field: The magnitude of impact is rated negligible. No special status plant species have been observed during field surveys, and no Priority Habitat occurs within temporary disturbance areas. The duration of loss of extent of special status plant species is rated constant. The likelihood is rated as unlikely, and the spatial extent is rated local.

Sellards Solar Field: Magnitude is rated low for loss of extent of special status plant species. No special status plant species have been observed during field surveys and areas of temporary disturbance would have been disturbed during construction reducing the likelihood of special status plant species occurring. However, the habitat mapping indicates 0.3 acres of sagebrush shrub-steppe would be impacted during construction, which is assumed to be required during decommissioning. The duration of loss of extent of special status plant species is rated constant. The likelihood is rated as unlikely, and the spatial extent is rated local.

Indirect Impacts

Indirect impacts are classified into two categories: habitat degradation and habitat fragmentation.

Habitat Degradation (All Solar Siting Areas)

The potential exists for habitat degradation to occur during the decommissioning of the solar arrays. Commitments proposed by the Applicant would meet state and county requirements for best practices, but habitat degradation could occur in the form of the introduction of hazardous substances, the potential for surface runoff, the introduction or spread of invasive plants and noxious weeds, and the deposition of dust. Impact ratings are identical to decommissioning of the turbines and is rated low, long-term, feasible, and local.

Habitat Fragmentation (All Solar Siting Areas)

Project decommissioning of the solar arrays has the potential to result in habitat fragmentation in the form of fire risk. The magnitude of impacts on vegetation resources is rated low. The duration is rated long term. The likelihood is rated as unlikely. Decommissioning of the solar arrays is not likely to require hot works. The spatial extent is local.

Battery Energy Storage Systems

No differences in impacts are anticipated among the three proposed locations, and the three BESSs are rated together in **Table 4.5-12c** (i.e., not broken out as individual BESS).

Direct Impacts

Direct impacts during decommissioning of the BESSs include the loss of extent of Priority Habitat, other habitat, and special status species.

Loss of Extent of Priority Habitat

The assessment of loss of Priority Habitat for the BESSs is rated negligible for temporary disturbance. The duration is short term. The likelihood is rated as unlikely, and the spatial extent is rated as limited.

Loss of Extent of Other Habitat

Loss of other habitats is rated negligible in magnitude for temporary disturbance. The duration is rated short term. The likelihood is rated as unavoidable, and the spatial extent is rated as limited.

Loss of Extent of Special Status Plant Species

The magnitude of impact is rated negligible. The duration of loss of extent of special status plant species is rated constant. The likelihood is rated as unlikely, and the spatial extent is rated local.

Indirect Impacts

Indirect impacts are classified into two categories: habitat degradation and habitat fragmentation.

Habitat Degradation

The potential exists for habitat degradation to occur during the decommissioning of the BESSs. Commitments proposed by the Applicant would meet state and county requirements for best practices, but habitat degradation could occur in the form of the introduction of hazardous substances, the potential for surface runoff, the introduction or spread of invasive plants and noxious weeds, and the deposition of dust. Impact ratings are identical to decommissioning of the turbines, and the impacts from decommissioning of the BESSs are rated low, long-term, feasible, and local.

Habitat Fragmentation

Project decommissioning of the BESSs has the potential to result in habitat fragmentation in the form of fire risk. The impact ratings are identical to the decommissioning of the solar arrays. Impacts are rated low, long term, unlikely, and local.

Substations

No differences in impacts are anticipated among the five proposed locations, and the five substations are rated together in **Table 4.5-12c** (i.e., not broken out as individual substations).

Direct Impacts

Direct impacts during decommissioning of the substations include the loss of extent of Priority Habitat, other habitat, and special status species.

Loss of Extent of Priority Habitat

Magnitude of impact related to loss of Priority Habitat for the substations and substations is rated negligible for temporary disturbance. The duration is short term. The likelihood is rated as unlikely, and the spatial extent is rated as limited.

Loss of Extent of Other Habitat

Magnitude of impact related to loss of other habitats is rated negligible for temporary disturbance. The duration is rated short term. The likelihood is rated as unavoidable, and the spatial extent is rated as limited.

Loss of Extent of Special Status Plant Species

Magnitude of impact is rated negligible. The duration of loss of extent of special status plant species is rated constant. The likelihood is rated as unlikely, and the spatial extent is rated local.

Indirect Impacts

Indirect impacts are classified into two categories: habitat degradation and habitat fragmentation.

Habitat Degradation

The potential exists for habitat degradation to occur during the decommissioning of the substations. Commitments proposed by the Applicant would meet state and county requirements for best practices, but habitat degradation could occur in the form of the introduction of hazardous substances, the potential for surface runoff, the introduction or spread of invasive plants and noxious weeds, and the deposition of dust. Impact ratings are identical to decommissioning of the turbines and the impacts from decommissioning of the substations are rated low, long term, feasible, and local.

Habitat Fragmentation

Decommissioning of the substations has the potential to result in habitat fragmentation in the form of fire risk. The impact ratings are identical to the decommissioning of the solar arrays. Impacts are rated low, long term, unlikely, and local.

Comprehensive Project

Impacts from decommissioning of the comprehensive Project consider all Project components together.

Direct Impacts

Direct impacts during decommissioning of the Project include the loss of extent of Priority Habitat, other habitat, and special status species.

Loss of Extent Priority Habitat

The assessment of impacts is the same as Turbine Option 1. Loss of Priority Habitat is rated high in magnitude for temporary disturbance. The duration is short term. The likelihood is rated as unavoidable, and the extent is rated as limited.

Loss of Extent of Other Habitat

The assessment of impacts is the same as Turbine Option 1. Loss of other habitats is rated low in magnitude for temporary disturbance. The duration is rated short term. The likelihood is rated as unavoidable, and the spatial extent is rated as confined.

Loss of Extent of Special Status Plant Species

The assessment of impacts is the same as Turbine Option 1. Loss of extent of special status plant species is rated low in magnitude. The duration of loss of extent of special status plant species is rated constant. The likelihood is rated as unlikely, and the spatial extent is rated as local.

Indirect Impacts

Indirect impacts are classified into two categories: habitat degradation and habitat fragmentation.

Habitat Degradation

The potential exists for habitat degradation to occur during the decommissioning of all Project components. Commitments proposed by the Applicant would meet state and county requirements for best practices, but habitat degradation could occur in the form of the introduction of hazardous substances, the potential for surface runoff, the introduction or spread of invasive plants and noxious weeds, and the deposition of dust. Impact ratings are identical to decommissioning of the turbines and the impacts from decommissioning of all Project components are rated low, long-term, feasible, and local.

Habitat Fragmentation

Project decommissioning of all Project components has the potential for habitat fragmentation in the form of fire risk. Impact ratings are identical to decommissioning of the turbines because the turbines present the greatest likelihood for an impact from fire. Impact ratings for all Project components are low, long-term, feasible, and local.

4.5.2.4 Applicant Commitments and Identified Mitigation

This section describes measures that would reduce or compensate for impacts related to vegetation from construction, operation, and decommissioning of the Project. These measures would be implemented in addition to compliance with the environmental permits, plans, and authorizations required for the Proposed Action. For vegetation resources, measures should be applied following a hierarchy of most effective to least effective: avoid, minimize, restore, compensate. A definition of each type of measure as related to vegetation resources that would be impacted by the Project is provided below.

- **Avoid:** refers to altering aspects of the Project such as location, scale, timing, or layout to avoid impacts on vegetation resources

- **Minimize:** refers to considering alternatives to location, size, or layout to create a smaller impact on vegetation resources
- **Restore:** refers to rectifying the impact by repairing, rehabilitating, or restoring the affected environment such as revegetating temporary disturbance areas
- **Offset/Compensate:** refers to conducting measures to rehabilitate areas not impacted by the Project to compensate for impacts on vegetation resources
- **Contingency:** refers to monitoring impacts from the Project and taking appropriate corrective actions, when it is not possible to predict with certainty the impact

Applicant Commitments

The Applicant has identified measures and/or best practices that are designed to prevent or minimize potential impacts on the affected environment for the Project. Measures presented by the Applicant in the ASC (Horse Heaven Wind Farm, LLC 2021a) and taken into consideration in the characterization of potential impacts on vegetation are discussed in Section 2.3 and summarized below. These are categorized as avoidance, minimization, restoration, and compensation measures.

The Applicant has provided the following avoidance measures for the Project (Horse Heaven Wind Farm, LLC 2021a, 2021c).

- Project facilities were sited on previously disturbed (e.g., cultivated cropland) areas to the extent feasible to avoid impacts on native habitats and associated wildlife species.
- The Project Layout has evolved over time to site Turbines at greater distance from the Columbia River. In the early stages of sitting, numerous steps were also taken to optimize the layout to maximize energy generation potential while minimizing impacts on resources, such as avoidance of BLM lands to the northwest. Noise impacts, impacts on Department of Defense radar facilities, and impacts on habitat all were considered and resulted in modification of the Project layout to reduce or avoid impacts on these resources. In addition, the Project has been designed to accommodate availability of interested landowners and availability of transmission lines with capacity to transmit power. A proposed point of interconnection with the BPA grid at Red Mountain was abandoned primarily due to concerns associated with agricultural and viewshed interests. Early Project layouts went through multiple iterations as each of these separate factors were considered in conjunction with the other.
- More specifically with regard to habitat and vegetation, preliminary (desktop) habitat mapping was done to identify priority habitats, and to the extent possible, these were avoided in developing Turbine and solar layouts. As the final design is developed, further refinement would occur to continue to reduce impacts on all resources where possible, while still meeting the Project’s purpose to generate clean renewable energy.
- In general, the majority of the Project would be sited in cultivated lands; 80 percent of the Micrositing Corridor and 79 percent of the Solar Siting Areas are on developed or disturbed land. Based on the preliminary layout as presented in the Project Application for Site Certification, within the Micrositing Corridor 85 percent of permanent disturbance would be on developed or disturbed land, while permanent disturbance to shrubland has been limited to 4 percent of the total disturbance area. The preliminary solar layout would also be primarily sited on agriculture land to minimize disturbance to habitat and vegetation, with 84 percent of permanent and modified disturbance occurring on this habitat type.

- Because the majority of this area is already farmed where the topography is suitable, land that would be suitable for solar development (generally flat) results in minimizing impacts on priority habitats. However, in a few cases the highest value wind resource coincides with uncultivated land, and three wind turbines would be retained on shrub-steppe land for this reason while other sites under consideration were dropped to reduce impacts. To the extent practicable, during final design, impacts on shrub-steppe land in the western portion of the Bofer Canyon Solar Siting Areas would be minimized because this is where the majority of solar impacts on rabbitbrush shrubland occur.
- Turbines were not placed in topographic low points, drainages, or swales where shrub-steppe habitat is common. The Project layout was also revised in 2020 to minimize impacts on shrub-steppe habitat in the northeastern portion of the Project area following baseline surveys conducted in 2020. Additional leases and portions of leases were terminated to reduce the Project footprint east of the Project site along the Columbia River.

The Applicant has provided the following minimization measures for the Project (Horse Heaven Wind Farm, LLC 2021a, 2021c).

- To minimize impacts on wildlife, baseline studies were conducted for the Project consistent with the WDFW Wind Power Guidelines (WDFW 2009), the U.S. Fish and Wildlife Service's 2012 Final Land-Based Wind Energy Guidelines (USFWS 2012), the 2013 USFWS Eagle Conservation Plan Guidance Module 1 – Land Based Wind Energy (USFWS 2013), and the USFWS 2016 Eagle Rule Revision (USFWS 2016). The Applicant used the results of these baseline studies to inform the Project's layout design to mitigate and avoid impacts on wildlife resources.
- The Project would use industry standard BMPs to minimize impacts on vegetation, waters, and wildlife.
- Sagebrush shrub-steppe habitat would be avoided to the extent possible. If avoidance is not possible, mitigation for impacts on sagebrush shrub-steppe habitat would be developed in consultation with the applicable agencies.
- If special status plant species are observed during preconstruction surveys, individuals and populations would be avoided to the extent possible. If avoidance is not possible, mitigation measures for impacts would be developed in consultation with the applicable agencies.
- The Applicant would limit construction disturbance by flagging any sensitive areas (e.g., wetlands, rare plant populations) and would conduct ongoing environmental monitoring during construction to ensure flagged areas are avoided.
- To minimize the impact of hazardous substances, a detailed Spill Prevention, Control, and Countermeasures Plan would be prepared by the Balance of Plant contractor and submitted to the Washington Energy Facility Site Evaluation Council (EFSEC) for review and approval. Spill kits would be stored on site at temporary and permanent locations.
- A TESC Plan would be developed and implemented, detailing specific BMPs that would be used and where they would be placed, as well as the total disturbance area. The TESC Plan would include measures to prevent erosion, contain sediment, and control drainage. The TESC Plan would also include installation details of the BMPs, as well as notes.

- A Stormwater Pollution Prevention Plan would be developed, detailing the activities and conditions at the site that could cause water pollution, and the steps the facility would take to prevent the discharge of any unpermitted pollution.
- Clearing, excavation, and grading would be limited to the parts of the Project area where these activities are necessary for construction and decommissioning of the Project. Areas outside the construction limits would be marked in the field, and equipment would not be allowed to enter these areas or disturb existing vegetation. To the extent practicable, existing vegetation would be preserved. Where vegetation clearing is necessary, root systems would be conserved if possible.
- Vegetated areas that are disturbed or removed during construction would be restored as near as reasonably possible to pre-disturbance conditions.
- Excavated soil and rock from grading would be spread across the site to the natural grade and would be reseeded with native grasses to control erosion by water and wind.
- Silt fencing would be installed throughout the Project as a perimeter control, and on the contour downgradient of excavations, the operations and maintenance facilities, and substations.
- Straw wattles would be used to decrease the velocity of sheet flow stormwater to prevent erosion. Wattles would be used along the downgradient edge of access roads adjacent to slopes or sensitive areas.
- Mulch would be used to immediately stabilize areas of soil disturbance and during reseeding efforts.
- Jute matting, straw matting, or turf reinforcement matting would be used in conjunction with mulching to stabilize steep slopes that were exposed during access road installation.
- Soil binders and tackifiers would be used on exposed slopes to stabilize them until vegetation is established.
- Concrete chutes and trucks would be washed out in dedicated areas near the foundation construction locations. This would prevent concrete washout water from leaving a localized area. Soil excavated for the concrete washout area would be used as backfill for the completed footing to ensure that the surface soils maintain infiltration capacity.
- Watering or other fugitive dust-abatement measures would be used as needed to control fugitive dust generated during construction.
- Construction materials that could be a source of fugitive dust would be covered when stored.
- Traffic speeds on unpaved roads would be limited to 25 miles per hour to minimize generation of fugitive dust.
- Truck beds would be covered when transporting dirt or soil.
- Active dust suppression would be implemented during construction.
- A dust control plan that identifies management practices and operational procedures to effectively control fugitive dust emissions would be developed and provided to the Benton Clean Air Agency prior to construction.
- Replanting or graveling disturbed areas would be conducted during and after construction to reduce wind-blown dust.

- The Applicant does not anticipate using pesticides during Project construction or operation. If unforeseen circumstances arise that require the use of pesticides, the Applicant would consult with WDFW and EFSEC regarding use of pesticides to avoid and minimize impacts on burrowing owl (per Larsen et al. 2004).
- To the extent practicable, during final design, impacts on shrub-steppe land in the western portion of the East Solar Field would be minimized because this area contains a large portion of the rabbitbrush shrubland that would be impacted by the solar arrays.
- To minimize the impact of noxious weeds, the Applicant would implement noxious weed prevention and control as outlined in the Revegetation and Noxious Weed Management Plan (Appendix N, Horse Heaven Wind Farm, LLC 2021a). The objective would be to prevent the introduction of new noxious weeds and to control the spread of noxious weeds established on site, which would be applied to construction and operation. BMPs for prevention are described in detail in Appendix N of the ASC. Control measures would include manual, mechanical, or chemical treatment of noxious weeds. The plan would also include monitoring and reporting, which would be conducted during construction and for a minimum of three years into operations by a qualified investigator.
- To minimize the impact of emergency situations, the Applicant has prepared an Emergency Response Plan (Appendix P, Horse Heaven Wind Farm, LLC 2021a) that includes the procedures to follow for potential emergencies, including fire prevention and control in the event of a fire.

Restoration measures for the Project as presented by the Applicant in Appendix N of the ASC are summarized below.

- A Revegetation Plan was prepared by the Applicant (Appendix N, Horse Heaven Wind Farm, LLC 2021a). The following provides details of the revegetation plan that was considered for the impact ratings. The Revegetation Plan describes methods, success criteria, monitoring, and reporting for revegetation of areas that would be temporarily disturbed during construction of the Project. A summary of key measures presented in the Revegetation Plan is provided below.
  - Following construction, temporarily disturbed areas would be revegetated with native plant species, or non-invasive, non-persistent non-native plant species, as described in the Revegetation and Noxious Weed Management Plan. The plan calls for revegetation of agriculture land to occur in consultation with the landowner. Non-agricultural land would be seeded.
  - The Applicant provided four example seed mixes, containing native plants to the area, but the final composition of seed mixes would be determined based on preconstruction conditions and the availability of seed at the time of procurement.
  - Two grassland seed mixes and two shrub-steppe seed mixes are proposed. One seed mix corresponds to species found in the dwarf shrub-steppe, and the second corresponds to species dominant in the sagebrush shrub-steppe. One of the grassland seed mixes is specific for the modified habitat under the solar arrays and includes only low-growing grasses and forbs. The second grassland seed mix contains a combination of grasses and forbs and would be used to re-seed areas that were not previously shrub-steppe or agriculture.
  - Modified habitat would be replanted under the solar arrays as described in the Revegetation and Noxious Weed Management Plan. The seed mix identified for the modified habitat includes low-growing grasses

and forbs: Sandberg bluegrass (*Poa secunda*), bottlebrush squirreltail (*Elymus elymoides*), prairie junegrass (*Koeleria macrantha*), milkvetch (*Astragalus* sp.), shaggy fleabane (*Erigeron pumilus*), and woolly plantain (*Plantago patagonica*).

- Areas that previously contained dwarf shrub-steppe would be planted with a seed mix appropriate for re-establishing dwarf shrub-steppe, and areas that previously contained sagebrush shrub-steppe would be planted with an appropriate seed mix, detailed in Appendix N of the ASC.
- Revegetation monitoring would be conducted annually for a minimum of three years except in cases where the landowner has converted the areas (e.g., to agriculture land). Following annual monitoring, a monitoring report would be prepared that would include recommendations for remedial actions, if any. Monitoring reports would be submitted to EFSEC within 60 days of the annual monitoring inspection.
- The success criteria identify trigger points that would require modifications to the Revegetation Plan based on the monitoring reports. For example, should total coverage from seeding not meet the success criteria, the environmental monitor may indicate areas that require additional seeding or soil amendments. Remedial action would be identified where the success criteria are not met by Year 3 (for revegetated grassland habitat) or Year 5 (for revegetated shrub-steppe habitat), which may include reseeding, planting with container plants, additional weed control, and other measures as needed.

Habitat offset and compensation measures for the Project are presented in Appendix L of the ASC are presented below.

- A Habitat Mitigation Plan (Appendix L, Horse Heaven Wind Farm, LLC 2021a) has been prepared consistent with the habitat offset requirements outlined in the WDFW Wind Power Guidelines (WDFW 2009). The Habitat Mitigation Plan proposes compensation ratios for temporary and permanent impacts. A summary of the habitat offset ratios is provided in **Table 4.5-11**.

Table 4.5-11: Habitat Offset Ratios Presented by the Applicant for Project Disturbance

Habitat Type	Habitat Class[(a)]	Temporary Disturbance Offset Ratio	Permanent Disturbance Offset Ratio	Modified Habitat Offset Ratio
Agricultural Land	Class IV	N/A	N/A	N/A
Developed/Disturbed	Class IV	N/A	N/A	N/A
Eastside (interior) Grassland (Eastside Steppe)	Class III	0.1:1	1:1	0.5:1
Non-native Grassland	Class III	0.1:1	1:1	0.5:1
Planted Grassland	Class III	0.1:1	1:1	0.5:1
Dwarf Shrub-steppe	Class II	1:1	2:1	2:1
Rabbitbrush Shrubland	Class II	0.5:1	2:1	0.5:1
Sagebrush Shrub-steppe	Class II	0.5:1	2:1	2:1

Source: Tetra Tech 2022
Note:
(a) Based on WDFW (2009) habitat classification for mitigation and the Class assigned to habitat types in Tetra Tech (2022).
N/A = not applicable

Recommended Mitigation Measures

EFSEC has identified the following additional mitigation measures for the Project to avoid and/or minimize impacts on vegetation:

Veg-1[17]: Tree Avoidance: Construction would avoid removing or disturbing trees within the Project Lease Boundary. Disturbance to trees includes any disturbance, including topping, within the drip-line of the tree (i.e., the area from the edge of the outermost branches), which preserves an intact root system. Disturbance within the drip-line of the tree should be avoided as this can lead to tree mortality. The avoidance area within the drip-line of trees in work areas should be delineated using snow fencing or similar measure to improve the visibility of avoidance zones. Trees cannot be removed without pre-approval. Where tree disturbance cannot be avoided by the Project (e.g., near transmission lines), the number and location of the trees would be provided to EFSEC, along with a statement justifying why avoidance cannot be achieved, and a mitigation plan. The mitigation plan would include replanting trees within the Lease Boundary to maintain the diversity of habitat structures provided by trees and would require approval by EFSEC prior to proceeding. This mitigation measure avoids physical disturbance to trees, which provide structural diversity for wildlife habitat.

Veg-2: Pre-Disturbance Surveys for Special Status Plant Species: Surveys for special status plant surveys would be conducted prior to clearing activities in areas of increased potential, including all Priority Habitat and areas identified by the Applicant as potential habitat for woven spore lichen. Surveys would be conducted by a qualified professional. Surveys would be conducted prior to both construction and decommissioning activities. All findings would be documented and provided to EFSEC. This mitigation measure minimizes potential impacts on special status plant species by providing an opportunity to

[17] Veg-: Identifier of numbered mitigation item for Vegetation

modify the design to avoid any identified plants, prior to actual disturbance activities during construction and decommissioning.

Veg-3: Special Status Plant Species Education: The environmental orientation provided to workers on site would include information on special status plant species. This would include diagnostic characteristics, suitable habitat descriptions, and photos of special status plant species with potential to occur within the Lease Boundary. A protocol would be established for any chance find by workers, who would notify the environmental monitor on site prior to proceeding with work. The mitigation measure minimizes impacts on special status plant species by educating workers in identification and suitable habitat.

Veg-4: As-Built Report and Offset Calculation: Within 60 days of completing construction, the Applicant would provide an as-built report that documents the amount of temporary and permanent disturbance associated with the Project. This would include associated maps and georeferenced spatial files. The as-built report would be factored into the final calculation of habitat offset based on the Applicant-provided ratios. The acreages of modified habitat planted for the Project under the solar arrays would also be included in this report. EFSEC would determine the number of years that vegetation monitoring of temporary disturbance and modified habitat would be conducted and the success criteria for revegetation. The success criteria would include measurable parameters that the Applicant would measure to determine whether successful revegetation has occurred. The Applicant would submit annual reports for each year of vegetation monitoring following construction to document the success of revegetation. At the end of the vegetation monitoring period, as determined by EFSEC, areas of modified habitat and revegetated temporary disturbance that have met the success criteria would be eligible for offset by the Applicant at the respective ratios. Any areas of modified habitat or temporary disturbance that do not meet the success criteria after completion of revegetation monitoring would be considered permanent disturbance, and this would be added to the offset requirement. The mitigation measure addresses habitat offset by providing a final calculation of offset requirements based on actual disturbance.

Veg-5: Operation and Decommissioning Dust Control Plan: A dust control plan would be prepared for Project operation and decommissioning, similar to the dust control plan presented by the Applicant. The plan would minimize impacts on vegetation from dust during the operations and decommissioning stages of the Project. The mitigation measure minimizes indirect impacts from dust during operation and decommissioning.

Veg-6: Decommissioning Legislated Requirements: Mitigation measures that would be applied during decommissioning would follow the applicable legislated requirements at the time of decommissioning. The mitigation measure enables adjustment of requirements based on changes in legislation once decommissioning occurs, based on the requirements at that time. **Veg-7: Detailed Site Restoration Plan:** The Detailed Site Restoration Plan (DSRP), required by WAC 463-72-050 would include a description of revegetation to be undertaken during decommissioning. The DSRP would be prepared and submitted for approval by EFSEC for final revegetation prior to Project decommissioning for the temporary and permanent disturbance areas, including modified habitat. The DSRP would be a living document. It would include the methods, success criteria, monitoring, and reporting for revegetation at the end of the Project life. It would also include provisions for adaptive management and would be updated based on any lessons learned from implementing the Revegetation Plan created for the temporary disturbance from Project construction (Appendix N, Horse Heaven Wind Farm, LLC 2021a). The mitigation measure provides specifications on the Detailed Site Restoration Plan for decommissioning.

Veg-8: Decommissioning Noxious Weed Management Plan: A Noxious Weed Management Plan (or extension of the current plan) to include prevention and control during decommissioning of the Project would be prepared. This Plan would include monitoring of the area for three years following decommissioning of the Project. The mitigation measure addresses noxious weeds during decommissioning. It is designed to minimize the introduction and spread of noxious weeds during decommissioning.

4.5.2.5 Significant Unavoidable Adverse Impacts

Determining the significance of an impact involves context and intensity, which, in turn depend on the magnitude and duration of an impact. “Significant” in the Washington State Environmental Policy Act means a reasonable likelihood of more than a moderate adverse impact on environmental quality. An impact may also be significant if its chance of occurrence is not great, but the resulting environmental impact would be severe if it occurred (Washington Administrative Code 197-11-794).

This Draft Environmental Impact Statement weighs the impacts on vegetation that may result from the Project with mitigation and makes a resulting determination of significance for each impact in **Tables 4.5-12a, 4.5-12b, and 4.5-12c**.

This Page Intentionally Left Blank

Table 4.5-12a: Summary of Potential Impacts on Vegetation during Construction of the Proposed Action

Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Loss of Extent of Priority Habitat – Temporary Disturbance	Turbine Option 1 Turbine Option 2 **Comprehensive Project**	Site clearing associated with temporary disturbance would result in direct loss of acreage associated with WDFW Priority Habitat.	High	Short Term	Unavoidable	Limited	**Veg-1:** Tree Avoidance **Veg-4:** As-Built Report and Offset Calculation	None identified
Loss of Extent of Priority Habitat – Temporary Disturbance	East Solar Field	Site clearing associated with temporary disturbance would result in direct loss of acreage associated with WDFW Priority Habitat.	Medium	Short Term	Unavoidable	Limited	**Veg-1:** Tree Avoidance **Veg-4:** As-Built Report and Offset Calculation	None identified
Loss of Extent of Priority Habitat – Temporary Disturbance	Sellards Solar Field	Site clearing associated with temporary disturbance would result in direct loss of acreage associated with WDFW Priority Habitat.	Low	Short Term	Feasible	Limited	**Veg-1:** Tree Avoidance **Veg-4:** As-Built Report and Offset Calculation	None identified
Loss of Extent of Priority Habitat – Temporary Disturbance	County Well Solar Field BESSs Substations	Site clearing associated with temporary disturbance would result in direct loss of acreage associated with WDFW Priority Habitat.	Negligible	Short Term	Unlikely	Limited	**Veg-1:** Tree Avoidance **Veg-4:** As-Built Report and Offset Calculation	None identified
Loss of Extent of Priority Habitat - Permanent Disturbance	Turbine Option 1 Turbine Option 2	Site clearing associated with permanent disturbance would result in direct loss of acreage associated with WDFW Priority Habitat.	Low	Long Term	Unavoidable	Limited	**Veg-1:** Tree Avoidance **Veg-4:** As-Built Report and Offset Calculation	None identified
Loss of Extent of Priority Habitat - Permanent Disturbance	East Solar Field **Comprehensive Project**	Site clearing associated with permanent disturbance would result in direct loss of acreage associated with WDFW Priority Habitat.	High	Long Term	Unavoidable	Limited	**Veg-1:** Tree Avoidance **Veg-4:** As-Built Report and Offset Calculation	None identified
Loss of Extent of Priority Habitat – Permanent Disturbance	County Well Solar Field Sellards Solar Field BESSs Substations	Site clearing associated with permanent disturbance would result in direct loss of acreage associated with WDFW Priority Habitat.	Negligible	Long Term	Unlikely	Limited	**Veg-1:** Tree Avoidance **Veg-4:** As-Built Report and Offset Calculation	None identified
Loss of Extent Other Habitat – Temporary Disturbance	Turbine Option 1 Turbine Option 2 **Comprehensive Project**	Site clearing associated with temporary disturbance would result in direct loss of acreage associated with other habitat.	Low	Short Term	Unavoidable	Confined	**Veg-1:** Tree Avoidance **Veg-4:** As-Built Report and Offset Calculation	None identified
Loss of Extent Other Habitat – Temporary Disturbance	Solar Arrays BESSs Substations	Site clearing associated with temporary disturbance would result in direct loss of acreage associated with other habitat.	Negligible	Short Term	Unavoidable	Limited	**Veg-1**: Tree Avoidance **Veg-4:** As-Built Report and Offset Calculation	None identified

Table 4.5-12a: Summary of Potential Impacts on Vegetation during Construction of the Proposed Action

Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Loss of Extent of Other Habitat – Permanent Disturbance	East Solar Field **Comprehensive Project**	Site clearing associated with permanent disturbance would result in direct loss of acreage associated with other habitat.	Low	Long Term	Unavoidable	Confined	**Veg-1:** Tree Avoidance **Veg-4:** As-Built Report and Offset Calculation	None identified
Loss of Extent of Other Habitat – Permanent Disturbance	Turbine Option 1 Turbine Option 2 County Well Solar Field Sellards Solar Field BESSs Substations	Site clearing associated with permanent disturbance would result in direct loss of acreage associated with other habitat.	Negligible	Long Term	Unavoidable	Limited	**Veg-1:** Tree Avoidance **Veg-4:** As-Built Report and Offset Calculation	None identified
Loss of Extent of Special Status Plant Species	Turbine Option 1 Turbine Option 2 **Comprehensive Project**	Site clearing associated with the construction of the Project would result in direct loss of populations of special status plant species or their habitat.	Medium	Constant	Feasible	Local	**Veg-2:** Pre-Disturbance Surveys for Special Status Plant Species **Veg-3:** Special Status Plant Species Education **Veg-4:** As-Built Report and Offset Calculation	None identified
Loss of Extent of Special Status Plant Species	East Solar Field	Site clearing associated with the construction of the Project would result in direct loss of populations of special status plant species or their habitat	Medium	Constant	Unlikely	Local	**Veg-2:** Pre-Disturbance Surveys for Special Status Plant Species **Veg-3:** Special Status Plant Species Education **Veg-4:** As-Built Report and Offset Calculation	None identified
Loss of Extent of Special Status Plant Species	Sellards Solar Field	Site clearing associated with construction of the Project would result in direct loss of populations of special status plant species or their habitat.	Low	Constant	Unlikely	Local	**Veg-2:** Pre-Disturbance Surveys for Special Status Plant Species **Veg-3:** Special Status Plant Species Education **Veg-4:** As-Built Report and Offset Calculation	None identified
Loss of Extent of Special Status Plant Species	County Well Solar Field BESSs Substations	Site clearing associated with construction of the Project would result in direct loss of populations of special status plant species or their habitat.	Negligible	Constant	Unlikely	Local	**Veg-2:** Pre-Disturbance Surveys for Special Status Plant Species **Veg-3:** Special Status Plant Species Education **Veg-4:** As-Built Report and Offset Calculation	None identified

Table 4.5-12a: Summary of Potential Impacts on Vegetation during Construction of the Proposed Action

Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Habitat Degradation	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Construction activities could result in habitat degradation from introduction of hazardous material, surface runoff, introduction and spread of invasive plants or noxious weeds, and deposition of dust.	Low	Long Term	Feasible	Local	No mitigation identified	None identified
Habitat Fragmentation	Turbine Option 1 Turbine Option 2 **Comprehensive Project**	Construction activities could result in habitat fragmentation from fire.	Low	Long Term	Feasible	Local	No mitigation identified	None identified
Habitat Fragmentation	Solar Arrays BESSs Substations	Construction activities could result in habitat fragmentation from fire.	Low	Long Term	Unlikely	Local	No mitigation identified	None identified

Notes:
[a] The impacts related to each component including “comprehensive Project” were rated separately; components were combined in the same cell if they received the same impact ratings for the identified topic.
[b] Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.
[c] Mitigation measures listed here are additional actions that EFSEC could impose to further reduce the impacts. See Section 4.1 Introduction for details.
[d] Significant unavoidable impacts are those that would remain even after all identified additional mitigation measures have been required by EFSEC.
BESS = battery energy storage system; EFSEC = Washington Energy Facility Site Evaluation Council; WDFW = Washington Department of Fish and Wildlife

Table 4.5-12b: Summary of Potential Impacts on Vegetation during Operation of the Proposed Action

Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Vegetation Maintenance	Turbine Option 1 Turbine Option 2 Solar Arrays **Comprehensive Project**	During Project operation, vegetation may require maintenance, such as cutting or removal, for areas under the solar arrays, or along roadways.	Negligible	Long Term	Probable	Confined	No mitigation identified	None identified
Vegetation Maintenance	BESSs Substations	During Project operation, vegetation may require maintenance, such as cutting or removal, for areas under the solar arrays, or along roadways.	Negligible	Long Term	Probable	Limited	No mitigation Identified	None identified
Habitat Degradation	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Project operations could result in habitat degradation from the introduction of hazardous substances, introduction and spread of noxious weeds and invasive plants, and deposition of dust.	Low	Long Term	Feasible	Local	**Veg-5:** Operation and Decommissioning Dust Control Plan	None identified
Habitat Fragmentation	Turbine Option 1 Turbine Option 2 Solar Arrays **Comprehensive Project**	Project operations could result in habitat fragmentation from edge effects and fire.	Low	Long Term	Feasible	Local	**Veg-5:** Operation and Decommissioning Dust Control Plan	None identified
Habitat Fragmentation	BESS	Project operations could result in habitat fragmentation from edge effects and fire.	Low	Long Term	Feasible	Local	**Veg-5:** Operation and Decommissioning Dust Control Plan	None identified
Habitat Fragmentation	Substations	Project operations could result in habitat fragmentation from edge effects and fire.	Low	Long Term	Unlikely	Local	**Veg-5:** Operation and Decommissioning Dust Control Plan	None identified

Notes:
(a) The impacts related to each component including "comprehensive Project" were rated separately; components were combined in the same cell if they received the same impact ratings for the identified topic.
(b) Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.
(c) Mitigation measures listed here are additional actions that EFSEC could impose to further reduce the impacts. See Section 4.1 Introduction for details.
(d) Significant unavoidable impacts are those that would remain even after all identified additional mitigation measures have been required by EFSEC.

BESS = battery energy storage system; EFSEC = Washington Energy Facility Site Evaluation Council; WDFW = Washington Department of Fish and Wildlife

Table 4.5-12c: Summary of Potential Impacts on Vegetation during Decommissioning of the Proposed Action

Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Loss of Extent of Priority Habitat – Temporary Disturbance	Turbine Option 1 Turbine Option 2 **Comprehensive Project**	Decommissioning of the Project would require temporary disturbance areas to remove Project components, which would result in direct loss of WDFW Priority Habitat.	High	Short Term	Unavoidable	Limited	**Veg-1:** Tree Avoidance **Veg-6:** Decommissioning Legislated Requirements **Veg-7:** Detailed Site Restoration Plan **Veg-8:** Decommissioning Noxious Weed Management Plan	None identified
Loss of Extent of Priority Habitat – Temporary Disturbance	East Solar Field	Site clearing associated with temporary disturbance would result in direct loss of acreage associated with WDFW Priority Habitat.	Medium	Short Term	Unavoidable	Limited	**Veg-1:** Tree Avoidance **Veg-6:** Decommissioning Legislated Requirements **Veg-7:** Detailed Site Restoration Plan **Veg-8:** Decommissioning Noxious Weed Management Plan	None identified
Loss of Extent of Priority Habitat – Temporary Disturbance	County Well Solar Field BESSs Substations	Site clearing associated with temporary disturbance would result in direct loss of acreage associated with WDFW Priority Habitat.	Negligible	Short Term	Unlikely	Limited	**Veg-1:** Tree Avoidance **Veg-6:** Decommissioning Legislated Requirements **Veg-7:** Detailed Site Restoration Plan **Veg-8:** Decommissioning Noxious Weed Management Plan	None identified
Loss of Extent of Priority Habitat – Temporary Disturbance	Sellards Solar Field	Site clearing associated with temporary disturbance would result in direct loss of acreage associated with WDFW Priority Habitat.	Low	Short Term	Feasible	Limited	**Veg1:** Tree Avoidance **Veg-6:** Decommissioning Legislated Requirements **Veg-7:** Detailed Site Restoration Plan **Veg-8:** Decommissioning Noxious Weed Management Plan	None identified
Loss of Extent Other Habitat – Temporary Disturbance	Turbine Option 1 Turbine Option 2 **Comprehensive Project**	Site clearing associated with temporary disturbance would result in direct loss of acreage associated with other habitat.	Low	Short Term	Unavoidable	Confined	**Veg-1:** Tree Avoidance **Veg-6:** Decommissioning Legislated Requirements **Veg-7:** Detailed Site Restoration Plan **Veg-8:** Decommissioning Noxious Weed Management Plan	None identified
Loss of Extent Other Habitat – Temporary Disturbance	Solar Arrays BESSs Substations	Site clearing associated with temporary disturbance would result in direct loss of acreage associated with other habitat.	Negligible	Short Term	Unavoidable	Limited	**Veg-1:** Tree Avoidance **Veg-6:** Decommissioning Legislated Requirements **Veg-7:** Detailed Site Restoration Plan **Veg-8:** Decommissioning Noxious Weed Management Plan	None identified

Table 4.5-12c: Summary of Potential Impacts on Vegetation during Decommissioning of the Proposed Action

Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Loss of Extent Special Status Plant Species	Turbine Option 1 Turbine Option 2 East Solar Field **Comprehensive Project**	Site clearing associated with decommissioning of the Project would result in direct loss of populations of special status plant species or their habitat.	Low	Constant	Unlikely	Local	**Veg-2:** Pre-Disturbance Surveys for Special Status Plant Species **Veg-6:** Decommissioning Legislated Requirements **Veg-7:** Detailed Site Restoration Plan **Veg-8:** Decommissioning Noxious Weed Management Plan	None identified
Loss of Extent Special Status Plant Species	Sellards Solar Field County Well Solar Field BESSs Substations	Site clearing associated with decommissioning of the Project would result in direct loss of populations of special status plant species or their habitat.	Negligible	Constant	Unlikely	Local	**Veg-2:** Pre-Disturbance Surveys for Special Status Plant Species **Veg-6:** Decommissioning Legislated Requirements **Veg-7:** Detailed Site Restoration Plan **Veg-8:** Decommissioning Noxious Weed Management Plan	None identified
Habitat Degradation	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Project decommissioning could result in habitat degradation from the introduction of hazardous material, surface runoff, introduction or spread of invasive plant or noxious weeds, and the deposition of dust.	Low	Long Term	Feasible	Local	**Veg-5:** Operation and Decommissioning Dust Control Plan **Veg-6:** Decommissioning Legislated Requirements **Veg-7:** Detailed Site Restoration Plan **Veg-8:** Decommissioning Noxious Weed Management Plan	None identified
Habitat Fragmentation	Turbine Option 1 Turbine Option 2 **Comprehensive Project**	Project decommissioning could result in habitat fragmentation from fire.	Low	Long Term	Feasible	Local	**Veg-6:** Decommissioning Legislated Requirements	None identified
Habitat Fragmentation	Solar Arrays BESSs Substations	Project decommissioning could result in habitat fragmentation from fire.	Low	Long Term	Unlikely	Local	**Veg-6:** Decommissioning Legislated Requirements	None identified

Notes:
[a] The impacts related to each component including "comprehensive Project" were rated separately; components were combined in the same cell if they received the same impact ratings for the identified topic.
[b] Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.
[c] Mitigation measures listed here are additional actions that EFSEC could impose to further reduce the impacts. See Section 4.1 Introduction for details.
[d] Significant unavoidable impacts are those that would remain even after all identified additional mitigation measures have been required by EFSEC.
BESS = battery energy storage system; EFSEC = Washington Energy Facility Site Evaluation Council; WDFW = Washington Department of Fish and Wildlife

4.5.3 Impacts of No Action Alternative

Under the No Action Alternative, impacts related to vegetation from the construction, operation, and decommissioning of the Proposed Action would not occur. For the purpose of this analysis, it is assumed that no future development would occur within the Lease Boundary.

This Page Intentionally Left Blank

4.6 Wildlife and Habitat

This section describes the potential impacts on wildlife and habitat resources, identified in Section 3.6, that could result from the construction, operation, and decommissioning of the Horse Heaven Wind Farm (Project, or Proposed Action) or under the No Action Alternative.

The evaluation presented here relies on the impact scale defined in Section 4.1 and summarized in **Table 4.6-1**. Acreage impacts presented in this section were calculated independently from the spatial data provided by Horse Heaven Wind Farm, LLC (Applicant) (Horse Heaven Wind Farm, LLC 2021b).

Table 4.6-1: Impact Rating Table for Wildlife and Habitat from Section 4.1

Factor	Rating →			
Magnitude	**Negligible** indistinguishable from the background	**Low** small impact, non-sensitive receptor(s)	**Medium** intermediate impact, may occur on sensitive receptor(s) or affect public health and safety	**High** large impact on sensitive receptor(s) or affecting public health and safety
Duration	**Temporary** infrequently during any stage	**Short Term** duration of construction or site restoration	**Long Term** during operation or operation plus another stage of Project	**Constant** during life of Project and/or beyond the Project
Likelihood	**Unlikely** not expected to occur	**Feasible** may occur	**Probable** expected to occur	**Unavoidable** inevitable
Spatial Extent/Setting	**Limited** small area of Lease Boundary or beyond Lease Boundary if duration is temporary	**Confined** within Lease Boundary	**Local** beyond Lease Boundary to neighboring receptors	**Regional** beyond neighboring receptors

4.6.1 Method of Analysis

In accordance with the Washington State Environmental Policy Act, this Draft Environmental Impact Statement (EIS) weighs the likelihood of occurrence with the severity of an impact (Washington Administrative Code [WAC] 197-11-794) and considers several factors when determining the significance of identified potential impacts (WAC 197-11-330 and WAC 197-00-794).

Direct impacts on special status wildlife species, such as mortality, may be confined to the Lease Boundary and are therefore rated as “local”; however, loss of an individual could result in indirect impacts beyond the local scale through loss of genetic diversity and vulnerability to random events, meaning the population is vulnerable to loss of an individual as this loss increases the risk of the regional population to external pressures.

As identified in **Table 4.6-2**, impact magnitude is determined based on potential impacts on wildlife populations, considering the type of impact and context (adaptability and resiliency) of the existing conditions. The context of impacts is important in order to characterize how close a population is to its expected resilience and adaptability limits. For this analysis, the ability of a species to accommodate disturbance was evaluated using the concepts of ecological adaptability and resilience. Adaptable wildlife species are those that can change their behavior, physiology, or population characteristics (e.g., reproduction rate) in response to a disturbance such that the integrity of the population remains unchanged. For example, certain wildlife populations can accommodate loss of some individuals without a change in overall population status or trajectory (known as compensatory mortality) (Connell et al.1984), or can adjust their physiology or behavior. Adaptable species can accommodate substantial disturbance and sometimes thrive in highly modified environments, whereas species with low adaptability can accommodate little or no disturbance.

Resilience is a concept that is distinct from, yet closely related to, adaptability. Biological populations often have inertia and will continue to function after disturbance up to the point where the disturbance becomes severe and long enough that the population undergoes a fundamental change. Adaptability influences the duration and magnitude of effect required for this to happen, whereas resilience defines the ability of a species or ecosystem to recover from disturbance. Highly resilient wildlife species have the potential to recover quickly from disturbance (e.g., after reclamation is achieved or a mortality source is removed), whereas species with low resilience will recover more slowly or may not recover at all (Weaver et al. 1996).

Table 4.6-2: Criteria for Assessing Magnitude of Impacts on Wildlife and Habitat

Magnitude of Impacts	Description
Negligible	The incremental change is so small that it is neither detectable nor measurable and is not anticipated to influence the viability of a wildlife population or species.
Low	The incremental change may be measurable and could result in a minor influence on the short term viability of a wildlife population; however, it is expected to be within the natural population variability and resiliency of a species and therefore not expected to impact the viability of the species or population over a longer period of time.
Medium	The incremental change is expected to result in a clearly defined change that could result in changes to the population over shorter and longer periods of time; however, it remains below a level of impact that could exceed the resiliency and adaptability limits of the population.
High	The incremental change is sufficiently large that it approaches or falls within the range of impacts that could exceed the resilience and adaptability of the species or population, potentially impacting the viability of the species or population.

Potential interactions between wildlife and habitat and Project components/activities during construction, operation and maintenance, and decommissioning were identified based on information provided in the Application for Site Certification (ASC) for the Project. Interactions can generally be grouped into the following impacts: habitat loss, wildlife mortality, barriers to movement, and habitat fragmentation.

Direct habitat loss (permanent and temporary) was quantified by habitat type. Methods to quantify direct loss are discussed in Section 4.5, Vegetation. Wildlife habitat loss is also qualitatively discussed using predicted distribution maps for state priority species, where available (NatureMapping n.d.). The final arrangement of the Project components has not been completed; therefore, habitat loss was conservatively estimated by calculating the loss associated with the Wind Energy Micrositing Corridor, East Solar Field, County Well Solar Field, and Sellards Solar Field. A description of these components can be found in Section 4.5.2.

Indirect habitat loss may occur due to Project-related changes in habitat quality or use. Indirect habitat loss does not result in the removal of habitat (e.g., footprint loss), but rather in a change in the quality of habitat that may reduce its function for wildlife species (e.g., increased noise disturbance). Quantifying indirect habitat loss can be challenging because of limited research studies on species' response to changes in the landscape (e.g., attraction to or avoidance of an area due to anthropogenic changes and human activity). A simple and conservative approach to quantifying indirect habitat loss is to apply a Zone of Influence (ZOI) around Project components. The purpose of the ZOI is to quantify habitat surrounding Project components that may be degraded due to changes caused by humans (e.g., soundscape, lightscape). A 0.5-mile (0.8 kilometer) ZOI was applied to Project components during operation based on a literature review, the details of which are presented in Section 4.6.2.2.

Sources of wildlife mortality that could result from the Project include collisions, strikes, consumption of toxic materials, and destruction of wildlife that becomes a nuisance (e.g., due to attraction to the Project). This assessment of potential wildlife mortality uses a combination of quantitative and qualitative methods. The Applicant measured the species-specific risk of collisions with the turbines using a bird exposure index. The exposure index was calculated using species' relative use, flight height, and flight time with data for these calculations collected through point count surveys conducted for small and large birds. The exposure indices provided by the Applicant have been used to assess mortality impacts on birds from the turbines. Bat species exposure indices were not calculated for the Project; however, bat mortality data from existing wind power projects were used to estimate potential bat mortality. Other sources of wildlife mortality (e.g., collisions with Project vehicles) are described qualitatively.

Barriers to wildlife movement occur when Project features prevent or change species' ability to move over the landscape. Barriers can include physical constraints (e.g., fencing), as well as features that species may avoid crossing (e.g., roads). Barriers to movement are considered qualitatively in this assessment based on existing literature, modeled and known movement corridors in the Lease Boundary, and the proposed Project layout (e.g., Wind Energy Micrositing Corridor, solar arrays, and roadways).

Habitat fragmentation occurs when extensive, continuous tracts of habitat are dissected into smaller, more isolated patches (Meffe and Carroll 1994; St-Laurent et al. 2009). Small, dispersed habitat patches may be less effective at providing the requisites of life, compared to larger continuous tracts for many wildlife species. The potential for the Project to fragment wildlife habitat was qualitatively analyzed using data on ecosystem distribution across the Lease Boundary and the proposed Project layout.

4.6.2 Impacts of Proposed Action

As noted in Section 4.6.1, Project-related impacts on wildlife and habitat can be broadly grouped into four general categories: direct habitat loss, indirect habitat loss, mortality, and barriers to movement/ fragmentation. The subsequent sections will provide a general discussion of the predicted Project-related impacts related to these four categories as they apply to that stage of the Project. Potential impacts on special status species are described separately from general wildlife and habitat impacts in Section 4.6.2.4. The Applicant has proposed a combination of turbine and solar array options. Turbine Option 1 would include installing up to 244 shorter (266-foot tower height, 499-foot blade height) turbines, while Option 2 would include installing up to 150 larger (557-foot tower height, 671-foot blade height) turbines. The Applicant has also proposed three different solar facility locations, though all three may not be constructed. Species-specific discussions are provided for special status species in Section 4.6.2.2 describing the operation stage, where an impact on that species is predicted.

4.6.2.1 Impacts during Construction

Impacts related to direct habitat loss, indirect habitat loss, wildlife mortality, and barriers to movement during construction are evaluated in this section.

Turbine Option 1 and Turbine Option 2

The Applicant has proposed two turbine options. Turbine Option 1 is generally expected to have a greater impact on habitat as construction of Turbine Option 1 will result in more direct loss than Turbine Option 2. Potential impacts on wildlife from indirect loss, mortality, and barriers to movement and fragmentation during construction are expected to be similar between the two options as both will require the construction of access roads and power lines, and mobilization of equipment. As such, the subsequent sections focus on the impacts of Turbine Option 1 as impacts from Option 2 are expected to be equal to or less than Option 1.

Habitat Loss from Construction of Turbines

The potential loss of habitat is considered greater for Turbine Option 1 (and was the only disturbance area provided by the Applicant); therefore, only this option is presented in **Table 4.6-3**. The Project would result in the direct loss of habitat through construction of the Wind Energy Micrositing Corridor and associated transportation routes. The Project may also result in indirect habitat loss through increased noise, light, and human presence during construction.

Impacts from turbine construction under Turbine Option 1 and Turbine Option 2 are predicted to have a medium impact on habitat loss that is short term for temporary disturbances (e.g., construction laydown areas) and constant for permanent footprint loss (e.g., turbine footprint), unavoidable, and local to within 0.4 miles of construction areas.

Wildlife Mortality from Construction of Turbines

The Project may result in mortality of smaller animals (e.g., birds, herptiles, small mammals) that are unable to move away from machinery during clearing and ground preparation work. Mobilization of equipment and construction-related traffic may result in wildlife-vehicle collisions during Project construction. Impacts from turbine construction under Turbine Option 1 and Turbine Option 2 are predicted to have a low-magnitude impact on wildlife mortality that is short term, feasible, and confined to the Lease Boundary.

Barriers to Movement and Habitat Fragmentation from Construction of Turbines

Turbines, power lines, roadways, and other linear infrastructure could create barriers to wildlife movement and fragment habitat. Barriers to wildlife movement and habitat fragmentation initiated during construction are expected to continue through operation. Details of potential impacts from barriers to movement and habitat fragment are provided in Section 4.6.2.2.

Turbine construction under Turbine Option 1 and Turbine Option 2 is predicted to have a low-magnitude impact on barriers to movement and habitat fragmentation that is long term (as linear features, such as power lines, would remain through the operation stage), probable, and confined to the Lease Boundary.

Solar Arrays

Habitat Loss from Construction of Solar Arrays

The Project would result in the direct loss of habitat through construction of the solar arrays and associated transportation routes. The Project may also result in indirect habitat loss through increased noise, light, and human presence during construction. The solar array would result in direct loss of habitat for larger species, such as pronghorn antelope (*Antilocapra americana*). The solar arrays would be located within fenced areas that are expected to prevent large wildlife species from accessing habitat within the arrays, although the fence lines would surround the array clusters leaving space between the clusters accessible. As the configuration of solar arrays within the identified solar footprints has not been defined, this assessment assumes that habitat within the identified solar footprints would be lost to medium and large wildlife.

Table 4.6-3 presents the predicted habitat loss that would result from the three proposed solar facilities. Of the three, it is expected that the East Solar Field would have the greatest impact on vegetation communities such as grasslands and shrublands that provide complex and functional wildlife habitat. The County Well and Sellards Solar facilities would be situated predominantly on agricultural lands and thus would have less impact on such communities.

Construction of the solar arrays would have a medium impact on habitat loss that is short term for temporary disturbances (e.g., construction laydown areas in agricultural fields) and constant for permanent footprint loss, unavoidable, and confined to the Lease Boundary.

Wildlife Mortality from Construction of Solar Arrays

The Project may result in mortality of smaller animals (e.g., birds, herptiles, small mammals) that are unable to move away from machinery during clearing and ground preparation works. Mobilization of equipment and construction-related traffic may result in wildlife-vehicle collisions during Project construction. Solar array construction is predicted to have a low-magnitude impact on wildlife mortality that is short term, feasible, and limited to the solar array fields, access roads, and ancillary facilities.

Table 4.6-3: Predicted Habitat Loss for the Solar Facilities

Habitat Type	East Solar Field		County Well Solar Field		Sellards Solar Field	
	Temporary Disturbance[b] (acres)	Permanent Disturbance[c] (acres)	Temporary Disturbance[b] (acres)	Permanent Disturbance [c] (acres)	Temporary Disturbance[b] (acres)	Permanent Disturbance [c] (acres)
Agriculture Land	85.6	1,075.1	30.0	2,580.4	85.0	1,934.0
Developed/Disturbed	2.7	<0.01	0.2	0	0.6	0
Grassland						
Eastside (Interior) Grassland[a]	7.9	72.5	0	0	0	0
Non-native Grassland	2.9	21.6	0.1	3.0	0.2	0
Planted Grassland	19.8	140.3	1.3	73.7	0.4	1.2
Shrubland						
Dwarf Shrub-steppe[a]	0	0	0	0	0	0
Rabbitbrush Shrubland	43.8	706.1	0	0	0	0
Sagebrush Shrub-steppe[a]	2.5	0.3	0	0	0.3	0
Total	**165.3**	**2,016.0**	**31.6**	**2,657.1**	**86.4**	**1,935.2**

Source: Horse Heaven Wind Farm, LLC 2021b; Tetra Tech 2021.

Notes:

(a) Washington State Department of Fish and Wildlife Priority Habitats

(b) Temporary disturbance is defined as habitat loss that would end when construction is complete and the area would be restored to pre-construction conditions (WDFW 2009). Temporary disturbance from Project construction would occur in equipment laydown areas, construction staging areas, some roads, and areas required for construction that would not be part of the permanent infrastructure. These areas would be revegetated once construction is complete. Calculations of areas were completed independently using spatial data provided by the Applicant

Permanent disturbance is defined as habitat loss that would persist throughout the life of the Project and would not be restored when construction is complete (WDFW 2009). Permanent disturbance from Project construction (which extends into operation and decommissioning) would occur in the areas of the final tower footings and associated access roads, the substations, fencing around the solar arrays, and all areas occupied by permanent structures. Permanent disturbance also includes areas identified by the Applicant as modified habitat, which includes areas within the fencing around solar arrays. Disturbances include areas under Project footprint features (e.g., turbines) that would be restored during decommissioning. Calculations of areas were completed independently using spatial data provided by the Applicant.

Barriers to Movement and Habitat Fragmentation from Construction of Solar Arrays

Solar arrays, solar array perimeter fencing, power lines, roadways, and other linear infrastructure could create barriers to wildlife movement and fragment habitat. Barriers to wildlife movement and habitat fragmentation initiated during construction are expected to continue through operation. Details of potential impacts from barriers to movement and habitat fragment are provided as part of the discussion of operation impacts in Section 4.6.2.2.

Construction of the solar arrays is predicted to have a low-magnitude impact on barriers to movement and habitat fragmentation that is long term (as linear features, such as power lines, would remain through the operation stage), unavoidable, and confined to the Lease Boundary.

Battery Energy Storage Systems

Habitat Loss from Construction of Battery Energy Storage Systems (BESSs)

The Project would result in the direct loss of habitat through construction of the BESSs. The Project may also result in indirect habitat loss through increased noise, light, and human presence during construction.

Construction of the BESS is predicted to result in a low-magnitude impact on habitat loss that is short term for temporary disturbances (e.g., construction laydown areas) and long term for permanent footprint loss, unavoidable, and limited to the areas of BESS construction.

Wildlife Mortality from Construction of BESSs

The Project may result in mortality of smaller animals (e.g., birds, herptiles, and small mammals) that are unable to move away from machinery during clearing and ground preparation works. Mobilization of equipment and construction-related traffic may result in wildlife-vehicle collisions during Project construction. BESS construction is predicted to have a negligible impact on wildlife mortality that is short term, feasible, and limited in extent.

Barriers to Movement and Habitat Fragmentation from Construction of BESSs

Construction of BESSs may create barriers to wildlife movement in the adjacent area, resulting in an impact that is predicted to be negligible, long term, unavoidable, and limited to the BESSs and surrounding area.

Substations

Habitat Loss from Construction of Substations

The Project would result in the direct loss of habitat through construction of the substations. The Project may also result in indirect habitat loss through increased noise, light, and human presence during construction.

Similar to the construction of BESSs, substation construction would have a low-magnitude impact on habitat loss that is short term for temporary disturbances (e.g., construction laydown areas) and long term for permanent footprint loss, unavoidable, and limited to the construction area.

Wildlife Mortality from Construction of Substations

Similar to wildlife mortality associated with the construction of the BESS, construction of substations may result in mortality of smaller animals (e.g., birds, herptiles, small mammals) that are unable to move away from machinery during clearing, ground preparation works, equipment mobilization, and traffic and is predicted to result in a negligible impact on wildlife mortality that is short term, feasible, and limited in extent.

Barriers to Movement and Habitat Fragmentation from Construction of Substations

Construction of substations may create barriers to wildlife movement in the adjacent area, resulting in an impact that is predicted to be negligible, long term, unavoidable, and limited to the substations and surrounding area.

Comprehensive Project

Habitat Loss from Comprehensive Project

Site clearing and grubbing is one of the most noticeable effects of the Project. The Applicant estimates that 593 acres of terrestrial vegetation would be permanently lost, 2,957 acres temporarily disturbed (e.g., temporary access roads), and 6,570 acres modified (e.g., under solar arrays) during the construction stage of the Project to accommodate the installation of Project infrastructure (i.e., turbines, roadways, solar arrays). Temporarily lost habitat would be restored after construction; however, the impact from permanently lost and modified habitat would persist throughout the operation and maintenance stage and a portion of the decommissioning stage until habitat functions in restored areas (e.g., sage brush) are re-established. The removal of vegetation reduces the landscape's capability to support wildlife. The effects of site clearing on habitat loss on wildlife species would vary with the time of year and the characteristics of the habitat being cleared. Although habitat is required for wildlife to exist, it is unlikely that there will be a linear relationship between abundance and habitat availability. The relationship between population density and the availability of habitat is influenced by many factors that may operate independently of habitat, including population densities of the target species and other species in the study area, and the effects of predation pressure, competition, and harvest (Garshelis 2000). The predicted modified, temporary, and permanent losses of habitat are summarized in **Table 4.6-4**, and further details can be found in Section 4.5.

Table 4.6-4: Total Acres of Habitat Types and Subtypes Identified by the Applicant for Temporary and Permanent Disturbance in the Wind Energy Micrositing Corridor, Solar Siting Areas, and Comprehensive Project in Comparison to Total Habitat Available in the Lease Boundary

Habitat Type	Wind Energy Micrositing Corridor (Turbine Option 1)		Solar Siting Areas		Comprehensive Project		Total Habitat Available in the Lease Boundary (acres)
	Temporary Disturbance[b] (acres)	Permanent Disturbance[c] (acres)	Temporary Disturbance[b] (acres)	Permanent Disturbance[c] (acres)	Temporary Disturbance[b] (acres)	Permanent Disturbance[c] (acres)	
Agriculture Land	2,263.9	391.2	200.6	5,589.5	2,323.9	5,802.8	53,450.1
Developed/Disturbed	19.3	1.5	3.5	0.01	19.3	1.6	855.7
Grassland							
Eastside (Interior) Grassland (Eastside Steppe)[a]	15.3	5.4	7.9	72.5	16.2	72.5	173.5
Non-native Grassland	136.0	11.5	3.2	24.7	137.3	36.1	1,635.5
Planted Grassland	259.8	23.3	21.5	215.3	263.0	236.0	4,338.3
Unclassified Grassland	0	0	0	0	0.01	0	6,125.2
Shrubland							
Dwarf Shrub-steppe[a]	8.9	1.1	0	0	8.9	1.1	23.2
Rabbitbrush Shrubland	145.0	41.6	43.8	706.1	152.3	717.2	3,037.7
Sagebrush Shrub-steppe[a]	31.4	1.1	2.8	0.3	31.4	1.4	1,372.0
Unclassified Shrubland	0	0	0	0	<0.01	0	1,436.6
Total	**2,879.6**	**476.6**	**283.3**	**6,608.3**	**2,952.2**	**6,868.7**	**72,427.9**

Sources: Horse Heaven Wind Farm, LLC 2021b; Tetra Tech 2021

Notes: Areas of overlap between temporary and permanent disturbance are only counted toward permanent disturbance. The sum of the acres within disturbance areas of the Wind Energy Micrositing Corridor and Solar Siting Areas may not equal the comprehensive Project due to overlapping areas. Modified habitat was calculated as the area within the solar fence line.

Disturbance areas were not provided by the Applicant for Turbine Option 2

(c) Washington State Department of Fish and Wildlife Priority Habitats

(d) Temporary disturbance is defined as habitat loss that would end when construction is complete and the area would be restored to pre-construction conditions (WDFW 2009). Temporary disturbance from Project construction would occur in equipment laydown areas, construction staging areas, some roads, and areas required for construction that would not be part of the permanent infrastructure. These areas would be revegetated once construction is complete. Calculations of areas were completed independently using spatial files provided by the Applicant (Horse Heaven Wind Farm, LLC 2021b).

Permanent disturbance is defined as habitat loss that would persist throughout the life of the Project and would not be restored when construction is complete (WDFW 2009). Permanent disturbance from Project construction (which extends into operation and decommissioning) would occur in the areas of the final tower footings and associated access roads, the substations, fencing around the solar arrays, and all areas occupied by permanent structures. Permanent disturbance also includes areas identified by the Applicant as modified habitat, which includes areas within the fencing around solar arrays. Disturbances include areas under Project footprint features (e.g., turbines) that would be restored during decommissioning. Calculations of areas were completed independently using spatial files provided by the Applicant (Horse Heaven Wind Farm, LLC 2021b).

Indirect habitat loss during construction could result from increased noise, light, and human presence on site during construction activities. Wildlife species responses to these changes are variable, with some species acclimatizing to activities and others avoiding areas under construction (Scholl and Nopp-Mayr 2021). Potential disturbances from construction would be restricted to the two-year construction period. During this period, it is expected that the magnitude of the impact could vary depending on the construction activities performed and location of these activities. Details on construction-related noise impacts are provided in the noise impact analysis presented in Section 4.11; however, the Applicant generally predicts sound pressure levels from construction equipment to range from 69 to 84 A-weighted decibels (dBA)[18] at 50 feet and 26 to 41 dBA at 2,000 feet linear distance from the noise source. The Applicant expects that existing ambient noise levels are approximately 30 dBA, although site-specific data have not been presented. The Applicant reports that Project construction activities would predominantly occur during daylight hours, thereby reducing potential nighttime disturbance to wildlife from construction noise and light.

It is expected that most mobile species, such as birds and mammals, would demonstrate some avoidance behavior during the construction period, resulting in a reduction of usable habitat in the Lease Boundary during this period. Based on noise data presented by the Applicant, disturbance could extend at least 2,000 feet (0.4 mile) from the source. As indirect impacts from the Project, including noise, light, and human presence, are predicted to persist into the operation stage, this impact is quantified further in Section 4.6.2.2.

The Project would result in the direct loss of habitat through construction of the comprehensive Project. The Project would result in the direct loss of habitat through construction of the Wind Energy Micrositing Corridor, solar arrays, BESSs, substations and associated transportation routes. The Project may also result in indirect habitat loss through increased noise, light, and human presence during construction.

Construction of the comprehensive Project is predicted to have a medium impact on habitat loss that is short term for temporary disturbances (e.g., construction laydown areas) and constant for permanent footprint loss, unavoidable, and local to within 0.4 miles of construction areas.

Wildlife Mortality from Comprehensive Project

Wildlife mortality can occur from incidents such as wildlife-vehicle collisions and bird strikes with infrastructure. This section is limited to general impacts on wildlife from Project-related mortality. Impacts on special status species are discussed separately in Section 4.6.2.4. These effects can be difficult to predict as data may be hard to obtain and are often incomplete when available (Berger 1995; Lehman et al. 2010). Sources of wildlife mortality during Project construction may include:

- Mortality from clearing and grubbing activities
- Wildlife-vehicle collisions
- Nest/den destruction and failure
- Removal of nuisance wildlife

[18] Sound pressure measurements are presented in dBA, which is weighted to human hearing levels that may not be directly comparable to hearing thresholds for wildlife as the weighting removes low and high frequencies that may be audible to some species but not to humans.

Less mobile animals, such as herptiles, may not be able to move away from machinery used for clearing and grubbing and are susceptible to mortality during these activities. Species may be more susceptible during specific times of the year. For example, amphibians are typically less mobile while in the larval life phase (spring/summer) and while hibernating over winter. The Project may result in mortality of smaller animals (e.g., birds, herptiles, small mammals) during clearing and ground preparation works, although a quantitative estimate of mortality has not been provided in the ASC.

Wildlife-vehicle collisions may occur when roads bisect habitat, requiring wildlife to cross roads to access adjacent areas. Wildlife-vehicle collisions may occur during Project construction, operation, and decommissioning; however, vehicle traffic is expected to be highest during the construction stage. Road mortalities are generally site-specific, and frequencies depend on the species and circumstances such as location, traffic volume, and speed (Jalkotzy et al. 1997; Oxley et al. 1974). For example, amphibians are particularly susceptible to vehicle-wildlife collisions when moving between habitat types, including to and from breeding sites, and when emerging young are dispersing (Fukumoto and Herrero 1998). Collisions are typically more common during dusk and nighttime, when nocturnal species are active and visibility is poor (Gunson et al. 2004).

Birds are often killed on roads (Jalkotzy et al. 1997). While bird species whose habitats are bisected by roads are vulnerable to some extent, specific levels of the effect are not commonly reported. Raptors and owls are susceptible to road kills because of their propensity for hunting small mammals within road allowances and scavenging road-killed animals. Rates of road-based mortality are typically specific to individual projects and can be influenced by the location of roads in unique habitat (e.g., wetlands), traffic volume, work hours, and vehicle speed.

Clearing and site preparation work may result in destruction or disturbance of bird nests or small mammal dens. Adult birds would be able to move away from clearing activities, but their young may not be able to move if clearing is conducted prior to fledging. Birds may abandon nests, and direct mortality may occur if clearing is conducted during the nesting season. Small mammal dens may be destroyed during ground-disturbing works, resulting in mortality of animals in the den. The magnitude of potential mortality is expected to vary depending on the season when work is conducted. For example, clearing work that takes place during the bird breeding season is expected to have greater risk of bird mortality due to the presence of bird nests, eggs, and fledglings than if such work is performed during the winter.

Wildlife may be attracted to construction sites, particularly if waste materials are not well managed. Wildlife attraction to a site can result in increased conflicts with workers and require removal of nuisance individuals. Urbanized species, such as coyote (Canis latrans) and raccoon (Procyon lotor), are tolerant of human presence and are more likely to access active construction sites to scavenge.

The Project may result in mortality of smaller animals (e.g., birds, herptiles, and small mammals) that are unable to move away from machinery during clearing and ground preparation works. Mobilization of equipment and construction-related traffic may result in wildlife-vehicle collisions during Project construction. Construction of the comprehensive Project is predicted to have a low-magnitude impact on wildlife mortality that is short term, feasible, and confined to the Lease Boundary.

Barriers to Movement and Habitat Fragmentation from Comprehensive Project

Project components could create barriers to wildlife movement and fragment habitat during construction. Barriers to wildlife movement and habitat fragmentation initiated during construction are expected to continue through operation. Details of potential impacts from barriers to movement and habitat fragment are provided in Section 4.6.2.2.

Construction of the comprehensive Project is predicted to have a low-magnitude impact on barriers to movement and habitat fragmentation that is long term (as linear features, such as power lines, would remain through the operation stage), probable, and confined to the Lease Boundary.

4.6.2.2 Impacts during Operation

Impacts predicted to occur during the operation stage of the Project include indirect habitat loss (disturbance), wildlife mortality, barriers to movement, and fragmentation. Additional direct habitat loss is not predicted to occur during the operation stage, although permanent loss (identified under Section 4.6.2.1) would continue throughout Project operation. These impacts are not discussed further in this section.

Turbine Option 1 and Turbine Option 2

The impacts on wildlife and wildlife habitat from Turbine Option 1 and Turbine Option 2 are expected to be similar through the operation stage. Therefore, the assessment of potential impacts of these options is combined in the sections below.

Habitat Loss from Operation of Turbines

Habitat directly lost during the construction of the Micrositing Corridor would persist through the operation stage. The Project may also result in indirect habitat loss through degradation of habitat in the 0.5 mile ZOI created by disturbances (e.g., noise, light) from turbines and associated infrastructure.

Impacts from turbine operation under Turbine Option 1 and Turbine Option 2 are predicted to have a medium-magnitude impact resulting in habitat loss that is constant, unavoidable, and local within 0.5 miles of turbines.

Wildlife Mortality from Operation of Turbines

Collisions of aerial wildlife species (e.g., birds and bats) with turbines are well documented and are expected to be the most notable potential source of mortality associated with the Project. The consequence of wind power projects on regional aerial wildlife populations varies by species group and project location. For example, available data from existing facilities suggest that passerine mortalities associated with turbine collisions may not result in population-level changes; however, projects situated near populations of rare species or unique stopover locations could result in more substantial changes (Arnett et al. 2007). In a synthesis of literature, Arnett et al. (2007) reported that bird mortalities are typically evenly distributed between nocturnally migrating passerines and resident birds. Mortalities occur year-round, peaking from April to October. The Applicant reports that turbine lighting is not predicted to change the mortality rate at turbines (Horse Heaven Wind Farm, LLC 2021c).

The ASC uses a species-specific exposure index to assess the potential risk of bird mortality from collisions with the proposed turbines. The index was developed from avian use survey data collected in the Lease Boundary. The Applicant concluded that the Project may result in a bird fatality rate similar to that of the nearby Nine Canyon Wind Project (2.6 birds per megawatt [MW] per year) also located in Benton County. The fatality rate at the Nine Canyon Wind Project is slightly higher than the Pacific regional average of 2.4 birds per MW per year. Twenty-two bird fatalities were reported from the Nine Canyon Wind Project over a 16-year reporting period (Horse Heaven Wind Farm, LLC 2021a).

The Applicant reports that horned lark (*Eremophila alpestris*), gray partridge (*Perdix perdix*), golden-crowned kinglet (*Regulus satrapa*), ring-necked pheasant (*Phasianus colchicus*), and chukar (*Alectoris chukar*) are commonly reported in fatality data and predicts that horned lark is the species most likely to be impacted by the Project, given its abundance in the Lease Boundary and susceptibility to wind power developments. This species is ranked as Apparently Secure (S4) in the State of Washington, though breeding bird survey data suggest an annual decrease (-2.3) in North America, and western states also report population declines (Beason 2020). Further, studies show that for small passerine (i.e., songbird) species, turbine-related mortalities resulting from currently developed wind farms constitute a small percentage of their total population size (<0.045 percent) (Erickson et al. 2014) and do not appear likely to lead to population-level impacts (AWWI 2020).

The potential risk of bird mortality was evaluated for the two turbine options (Option 1 with up to 244 turbines with 266-foot tower height and 499-foot blade height and Option 2, with up to 150 turbines with 557-foot tower height and 671-foot blade height). It is predicted that Turbine Option 1 would result in a higher risk of collisions for small birds and raptors than Option 2 (GAL 2022; **Appendix 4.6-1**). Waterfowl may be more susceptible to collisions with the taller turbines in Option 2; however, raptors are reported to have higher exposure indices for shorter turbines than taller turbines and therefore are considered to be more susceptible to collisions with turbines under Option 1. The Project design has been reconfigured to reduce potential interactions with large waterfowl, such as the American white pelican (*Pelecanus erythrorhynchos)* (see Section 4.6.2.4).

Collision with turbines is considered one of the greatest threats to bats in North America (O'Shea et al. 2016). Bat mortalities are most frequently reported in late summer to early fall (90 percent) during fall migration (Arnett et al. 2007). Based on data from 52 wind farms in Washington, hoary and silver-haired bats (*Lasiurus cinereus* and *Lasionycteris noctivagans*) made up 52 and 44 percent of reported bat mortalities, respectively (WEST 2019). Considering that only three species account for most bat mortalities resulting from turbine collisions, population-level impacts on these species may become an issue as the number of wind farms increases (Barclay et al. 2007; Hein and Schirmacher 2016; Zimmerling and Francis 2016). Demographic modeling suggests that mortality from wind turbines may substantially reduce population size of the hoary bat and increase its risk of extinction (Frick et al. 2017). The bat fatality rate at the nearby Nine Canyon Wind Project was 2.47 bats per MW per year and consisted entirely of hoary and silver-haired bats (Horse Heaven Wind Farm, LLC 2021a). The Applicant predicted that bat mortalities during operation of the Project (Horse Heaven Wind Farm, LLC 2021a) would:

- Be within the range of other facilities in Washington
- Consist primarily of migratory, tree-roosting species (e.g., silver-haired bat, hoary bat)
- Occur mainly in the fall

The relationship between turbine height and bat collision mortalities is inconclusive, and it is unclear which turbine option would result in greater impacts on bats.

Turbine operation under Turbine Option 1 and Turbine Option 2 is predicted to have a medium impact on wildlife mortality that is long term, probable, and confined to the Lease Boundary.

Barriers to Movement and Habitat Fragmentation from Operation of Turbines

The operation of turbines, power lines, roadways, and other linear infrastructure could result in barriers to wildlife movement and fragment habitat. Barriers and fragmentation created during construction would predominantly remain through operation. Turbine operation under Option 1 and Option 2 is predicted to have a medium impact on barriers to movement and habitat fragmentation that is long term, probable, and confined to the Lease Boundary.

Solar Arrays

Habitat Loss from Operation of Solar Arrays

Habitat directly lost during construction of the solar arrays would predominantly persist through the operation stage into decommissioning, though areas under the solar arrays (modified habitat) may continue to provide habitat with reduced or altered function. Habitat under solar arrays would be revegetated with a grass mix, which is expected to provide foraging and shelter habitat for some species (e.g., small mammals); however, this would not provide the same ecological role or function as mature native sagebrush habitat. Operation of the solar arrays may also result in indirect habitat loss through degradation of habitat in the 0.5-mile ZOI created by disturbances from solar arrays and associated infrastructure.

Solar array operation is predicted to have a medium impact on habitat loss that is constant, unavoidable, and confined to the Lease Boundary.

Wildlife Mortality from Operation of Solar Arrays

There is limited published literature on fatality rates associated with solar facilities. It is postulated that water-associated birds (e.g., herons) and water obligates are more likely to interact with solar facilities because these species may perceive the facilities as waterbodies when they are in flight, a phenomenon known as the “lake effect.” In a synthesis of monitoring studies from 10 facilities, Kosciuch et al. (2020) reported taxonomic variability in the bird fatalities observed at different solar sites; however, mourning doves (*Zenaida macroura*), horned larks, and western meadowlarks (*Sturnella neglecta*) were reported at all sites. Mortalities of water-associated birds and water obligates occurred at most solar sites in the Sonoran and Mojave Deserts Bird Conservation Region but were less common in the Great Basin and Coastal California Bird Conservation Regions. Further, most of these fatalities involved ground-dwelling species (three out of four most common species detected) and were detected during the fall. Kosciuch et al. (2020) estimated an annual fatality rate of 2.49 fatalities per MW per year at facilities in the southwestern United States.

It has been demonstrated that bats may not be able to detect the difference between water and other smooth surfaces in laboratory settings (Greif and Siemers 2010; Russo et al. 2012), which could increase their risk of collision with solar arrays. However, there is limited information on the frequency of bat mortalities at these locations, and Russo et al. (2012) noted that bats typically moved to alternative locations after failed drinking attempts.

Mortality of other wildlife groups, such as amphibians, herptiles, and mammals, due to solar arrays is poorly understood. Changes in ground temperature and water conditions could impact wildlife survivorship within array footprints; however, the extent of the effect is not well understood.

Solar array operation is predicted to have a low-magnitude impact on wildlife mortality that is long term, feasible, and confined to the Lease Boundary.

Barriers to Movement and Habitat Fragmentation from Operation of Solar Arrays

Fencing for the solar arrays would be limited to the panel clusters, rather than encompassing the entire facility footprint. Fencing is expected to create barriers for larger mammals, such as pronghorn antelope, from accessing habitat around the arrays. Herptiles, small mammals, and small birds are expected to be able to continue to access vegetation around the arrays through the fencing. The east solar field would be situated on a movement corridor and may impact wildlife movement. The potential loss or alteration of the habitat around the arrays has already been considered in the discussion of direct and indirect loss, above.

Solar array operation is predicted to have a medium magnitude impact on barriers to movement and habitat fragmentation that is long term, probable, and confined to the Lease Boundary.

Battery Energy Storage Systems

Habitat Loss from Operation of BESSs

Habitat directly lost during construction of the BESSs would predominantly persist through the operation stage. Operation of the BESSs may also result in indirect habitat loss through degradation of habitat in the 0.5-mile ZOI created by disturbances from these features.

BESS operation is predicted to have a negligible impact on habitat loss that is long term, unavoidable, and limited to the BESSs and surrounding area.

Wildlife Mortality from Operation of BESSs

Wildlife mortality may occur due to collisions with infrastructure, including BESSs. BESSs operation is predicted to have a negligible impact on wildlife mortality that is long term, unlikely to occur, and limited to the BESS areas.

Barriers to Movement and Habitat Fragmentation from Operation of BESSs

BESSs may create barriers to wildlife movement by altering wildlife movement through and around the BESSs and adjacent areas. BESS operation is predicted to have a low impact on barriers to movement and habitat fragmentation that is long term, feasible, and limited to the BESS areas.

Substations

Habitat Loss from Operation of Substations

Habitat directly lost during construction of the substations would predominantly persist through the operation stage. Operation of the substations may also result in indirect habitat loss through degradation of habitat in the 0.5-mile ZOI created by disturbances from these features.

Substation operation is predicted to have a negligible impact on habitat loss that is long term, unavoidable, and limited to the substation and surrounding area.

Wildlife Mortality from Operation of Substations

Wildlife mortality may occur due to collisions with infrastructure, including substations. Substation operation is predicted to have a negligible impact on wildlife mortality that is long term, unlikely to occur, and limited to the substation areas.

Barriers to Movement and Habitat Fragmentation from Operation of Substations

Substations may create barriers to wildlife movement by altering wildlife movement through and around the substations and adjacent area. Substation operation is predicted to have a low impact on barriers to movement and habitat fragmentation that is long term, feasible, and limited to the substation areas.

Comprehensive Project

Habitat Loss from Operation of Comprehensive Project

As indicated in the ASC, in addition to direct impacts of wind turbines, solar arrays, and associated infrastructure on wildlife, indirect impacts on wildlife could occur (Horse Heaven Wind Farm, LLC 2021a), such as:

- **Displacement:** Wind turbines could cause displacement of wildlife from proximal habitats due to sensory disturbance, such as noise and visual distraction, which can effectively cause habitat loss (Drewitt and

Langston 2006). Multiple studies indicate that bird and mammal abundance decreases with increasing proximity to infrastructure such as wind turbines (Benítez-López et al. 2010; Drewitt and Langston 2006; Smith et al. 2020).

- **Change in Behavior:** Species may change their behavior to avoid specific components of the Project or the Lease Boundary. For example, birds may alter their flight paths to avoid contact with wind turbines. Altered flight paths could require additional energy expenditure, which in turn impacts individual fitness (Drewitt and Langston 2006).

Displacement as an indirect impact can equate to a type of habitat degradation or loss (Drewitt and Langston 2006). While the habitat is still present, it is no longer functional or providing the same resources to wildlife. Indirect impacts on wildlife due to avoidance and behavioral changes are the greatest habitat-related impacts from wind power facilities because the impacts increase wildlife habitat fragmentation (Arnett et al. 2007). It is acknowledged that the response and the magnitude of indirect impacts from wind turbines vary among species; however, multiple studies have found that infrastructure, including wind turbines, causes indirect impacts on wildlife and wildlife habitat that are greater than the sum of the direct habitat loss impacts (Benítez-López et al. 2010). Changes in ambient conditions such as noise, light, and visual scape due to Project operation may result in a change in wildlife behavior; however, the extent and duration of these changes are difficult to predict and require some inferences from other industries.

Noises above certain levels tend to alter wildlife behavior, potentially increasing their metabolic rates and stress levels (Manci et al. 1988) and contribute to increased energy expenditures due to increased movement around infrastructure (Bradshaw et al. 1997). Depending on the timing and level of stress, potential results of stresses include interference with communication and reduced reproductive success (Habib et al. 2007). For example, noise may cause changes in the frequency and duration of amphibian calling effort (Lengagne 2008) and may result in a reduction in the pairing success of birds due to interference with communication (Habib et al. 2007). A synthesis of literature on the effects of noise on wildlife suggests that terrestrial wildlife generally respond to noise levels around 40 dBA, with most showing impacts around 50 dBA (Shannon et al. 2016).

There is a lack of literature available examining the impacts of light on wildlife. It is often difficult to separate the combined influence of industrial noise, artificial light, and edge effect on wildlife species. Artificial light has the potential to affect the timing of reproductive behavior of wildlife species (Kempenaers et al. 2010). The Project is anticipated to require security lighting at the substations, operations and maintenance (O&M) facilities, and BESSs. In addition, Federal Aviation Administration (FAA) requirements dictate that aviation lighting would be required on the turbine nacelles, along with mid-tower lighting for turbines with blade tip heights above 599 feet. Lighting would also be required on the four permanent meteorological towers (met towers). FAA lighting would not be steady but rather would be blinking. Nighttime light trespass modeling has not been conducted.

Several studies have estimated distances from wind turbines where wildlife may be disturbed. For example, Leddy et al. (1999) reported decreased breeding bird densities within 262 feet (80 meters) of turbines, while Johnson et al. (2000) and Erickson et al. (2004) reported lower densities of grassland birds within 328 feet (100 meters) of turbines. Shaffer and Buhl (2016) reported that species are often displaced within 328 feet (100 meters) and can extend beyond 984 feet (300 meters). Similarly, breeding passerine densities are lower on Conservation Reserve Program (CRP) land with wind turbines compared to CRP land without turbines in grassland ecosystems (Leddy 1996). Densities of songbirds increase with increasing distances from wind turbines, and avoidance was attributed to disturbance from noise and wind turbine maintenance (Leddy 1996).

Studies conducted at the Buffalo Ridge Wind Farm in southwestern Minnesota reported that no raptor nests were recorded within 7,907 acres (32 square kilometers [km^2]) of the Project, though raptor nest density away from the Project was measured at 5.94 nests per 24,710 acres (100 square kilometers) (Usgaard et al. 1997). Other studies suggest that some raptor species may nest 0.5 miles (800 meters) from wind power facilities (Johnson et al. 2003), and Garvin et al. (2011) reported a 47 percent reduction in raptor abundance within 328 feet (100 meters) of turbines. Disturbance was estimated to be larger, approximately 1 mile (1,600 meters), for prairie chickens (*Tympanuchus cupido*) (Robel 2002). Wind farms may also be avoided by waterfowl and water-associated birds, which have been reported to be deterred 328 feet (100 meters) to 1,970 feet (600 meters) from turbines (Larsen and Madsen 2000; Rees 2012).

Bat activity may also vary near turbines, with some studies suggesting that bat activity may be reduced within approximately 0.6 miles (1,000 meters) of wind power projects (Barré et al. 2017), and others suggesting that bats may be attracted to wind farms (Richardson et al. 2021). Lopucki et al. (2017) reported that herbivorous mammals seemed to avoid areas within 0.44 miles (700 meters) of wind farms. A study of female pronghorns before and after wind turbine development found that pronghorns avoided wind turbines that were constructed within their winter range. Areas within the home range that were previously used prior to wind turbine construction were subsequently avoided during the winters following construction (Smith et al. 2020). As reported by the Applicant, disturbance and displacement may not occur immediately after construction or onset of operation but could occur over time (Horse Heaven Wind Farm, LLC 2021a).

Similarly, there are limited data describing changes in wildlife behavior and densities in response to solar array operation (Chock et al. 2020; Lovich and Ennen 2011). Lovich and Ennen (2011) suggest that operation of solar facilities could result in a variety of disturbance impacts on wildlife such as noise impacts, electromagnetic field impacts, microclimate impacts, pollution, water consumption, fire impacts, and light impacts. Chock et al. (2020) noted that habitat changes from solar arrays may influence wildlife movement patterns, reproductive success, and physiological stress. Habitat modifications and isolation (e.g., fencing) associated with solar arrays may alter predator and antipredator behavior (e.g., predator avoidance). For example, insects and other species that are attracted to light could be drawn to solar arrays, resulting in increased density and activity of insectivorous species (Chock et al. 2020). Conversely, fencing and shelter produced by solar panels may attract smaller prey species because these features of the arrays may reduce predation success.

Species that can acclimatize to modified environments may not display avoidance behavior around wind power facilities (Johnson et al. 2000), though they may avoid specific components of the facility, such as roads. As noted in the ASC, some displacement of raptors and functional loss of foraging habitat are expected to result from the Project (Horse Heaven Wind Farm, LLC 2021a). To quantify the indirect impacts of the Project, a ZOI was developed for the Project. A distance of 0.5 miles (800 meters) from Project infrastructure was selected as the ZOI. This distance was selected based on:

- Literature suggesting that mean abundance of birds declines within 0.5 miles (800 meters) of infrastructure (Benítez-López et al. 2010)
- Literature published on the displacement distances from wind farms, discussed above
- Application of conservative assumptions to account for uncertainty in the literature

With the application of the 0.5-mile ZOI, the Project is predicted to result in the disturbance (indirect loss) of an additional 53,127 acres of habitat, the majority (74 percent) is agricultural land. A summary of estimated indirect loss, calculated by habitat type, is provided in **Table 4.6-5** and shown in Figure 3.6-1. The calculation of indirect loss was estimated using Turbine Option 1 because this option is expected to involve a greater spatial distribution of turbines than Option 2.

Table 4.6-5: Summary of Estimated Indirect Habitat Loss

Habitat Type	Acres	Percentage of Total Indirect Loss
Agriculture Land	39,169	74%
Developed/Disturbed	699	1.3%
Eastside (Interior) Grassland[(a)]	85	<1%
Grassland	4,576	8.6%
Non-native Grassland	1,462	2.8%
Planted Grassland	3,246	6.1%
Dwarf Shrub-steppe[(a)]	13	<1%
Rabbitbrush Shrubland	1,678	3.2%
Sagebrush Shrub-steppe[(a)]	1,019	1.9%
Shrubland	1,181	2.2%
Total	**53,128**	

Notes: Calculations of areas were completed independently using spatial files provided by the Applicant.
(a) Washington State Department of Fish and Wildlife Priority Habitats

Operation of the comprehensive Project would result in the direct loss of habitat. Direct loss of habitat associated with Wind Energy Micrositing Corridor, solar arrays, BESSs, substations, and associated transportation routes initiated during construction would continue through Project operation. The Project may result in indirect habitat loss through degradation of habitat in the ZOI created by disturbances (e.g., noise, light) from Project infrastructure.

Operation of the comprehensive Project is predicted to have a medium impact on habitat loss that is constant, unavoidable, and local to within 0.5 miles of Project components.

Wildlife Mortality from Operation of Comprehensive Project

Operation of the Project presents several sources of potential wildlife mortality, such as collisions with infrastructure, change in prey structure, and ingestion of toxic materials. Potential impacts on wildlife from collision with turbines and solar arrays are analyzed in the sections below.

In addition to collisions with turbines and solar arrays, fatalities could also occur from strikes with power lines, windows, weather towers, and vehicles. Collision frequency with these infrastructure components is challenging to predict because site-specific factors, such as siting of infrastructure and local species composition, influence the frequency of mortality. It is estimated that between 12 million and 64 million birds are killed annually in the United States due to interactions with power lines (Loss et al. 2014). D’Amico et al. (2019) suggest that large, longer-living species with a low reproductive rate (e.g., raptors) tend to be at greater risk of collision with power lines. Further, behavioral traits, such as flight height within the range of power lines, increase the risk of collisions. It is expected that some mortality would occur due to collisions with overhead power lines, weather towers, and other infrastructure. This effect is expected to be more pronounced for larger birds, such as raptors.

Wildlife may also be killed on access roads developed for the Project. Access roads, arterial roads, and highways can be a substantial source of mortality, particularly for smaller wildlife such as herptiles and rodents. Wildlife can be attracted to roads as the granular base provides a unique habitat (e.g., road edge used for burrowing, and road surface used for thermoregulation). However, the Applicant does not predict that Project operations would require substantial road traffic. Therefore, road-based mortality is not predicted to be a substantial source of wildlife mortality, given the Applicant commitments discussed in Section 4.6.2.5.

The Applicant does not predict mortalities from interactions with hazardous or toxic materials because these materials would be stored and handled according to applicable environmental laws (Horse Heaven Wind Farm, LLC 2021a). Therefore, interactions with these substances would be limited to unexpected events such as accidents and malfunctions.

Changes and alterations due to human activity can influence predator-prey structure, as well as inter-species composition. Increased activity and infrastructure can deter larger predators from the landscape by creating a prey “refuge” (Muhly et al. 2011). Anthropogenic changes can also result in increased abundance of human-tolerant species, such as corvids, which are able to out-compete or prey on wildlife that existed prior to development. These changes may lead to lower survivorship of predators and their offspring, resulting in increased mortality.

The Project may result in mortality of aerial species (birds and bats) through collisions with turbines, power lines, solar arrays, windows, and weather towers. Other sources of mortality on wildlife, including non-aerial species, include vehicle collisions and changes in food availability. Operation of the comprehensive Project is predicted to have a medium impact on wildlife mortality that is long term, probable, and confined to the Lease Boundary.

Barriers to Movement and Habitat Fragmentation from Operation of Comprehensive Project

Barriers to Movement

Barriers to movement have been widely discussed in literature (Bromley 1985; Berger 1995; Jalkotzy et al. 1997). Barriers to movement occur when infrastructure bisects a movement corridor or habitat, reducing or prohibiting wildlife movement between habitat patches. These barriers can be physical constraints, such as fencing, but also include perceived barriers, such as forest openings, roads, and power lines. While linked to habitat fragmentation, barriers to movement can occur in already fractured landscapes where wildlife persists. Infrastructure associated with wind turbines could create barriers to wildlife movement (Roman et al. 2020).

The Washington Wildlife Habitat Connectivity Working Group has modeled movement corridor linkages to facilitate landscape level habitat management. These linkages were developed based on a composite of focal species habitat mapping (WHCWG 2012). Generally, the Project would be situated in areas classified with low and medium linkage ratings; polygons classified with high movement corridor class rating occur north and south of the Wind Energy Micrositing Corridor and within the Lease Boundary (Figure 3.6-2). Further, much of the Horse Heaven Hills ridgeline is considered a “pinch-point” for wildlife movement (rated as very high) (WHCWG 2013). A pinch-point is defined as a “portion of the landscape where movement is funneled through a narrow area. Pinch points can make linkages vulnerable to further habitat loss because the loss of a small area can sever the linkage entirely” (WHCWG 2012). The Applicant reports that Project turbines would be located away from the escarpment that runs east-west along the northern perimeter of the Lease Boundary. The Project bisects some areas rated as high linkage along the Horse Heaven Hills ridgeline and one to the south, adjacent to Highway 395. As discussed above, wildlife may avoid infrastructure that bisects these linkages, which would restrict their movement. It is noted that these linkages were created based on modeled habitat, and empirical data assessing wildlife usage were not used to verify movement corridors. Based on the overlap with modeled movement corridors, the Project may impact wildlife movement over the local landscape, particularly the north-south corridor west of Highway 395, which would be bisected by the Project.

The Applicant notes that the Project would be located along the Pacific flyway, and migrating birds, including waterfowl, shorebirds, and waterbirds, may move over the Lease Boundary to access stopover sites in adjacent areas (e.g., Columbia River). Based on avian field data collected by the Applicant, the Lease Boundary is not expected to provide stopover habitat, nor is it located along concentrated migration routes (Horse Heaven Wind Farm, LLC 2021a).

New access roads may result in barriers to movement for smaller wildlife species, such as mice, voles, and herptiles (e.g., MacPherson et al. 2011; Paterson et al. 2019; Shepard et al. 2008), though the magnitude of the resulting impact varies based on road type and habitat (Kroeger et al. 2021; Forman et al. 2002). The Applicant proposes to construct up to 105 miles of new access roads. Roads are expected to be 16 feet wide. The proposed access roads are not expected to be heavily used, which is predicted to reduce the potential for creating barriers to movement. However, new access roads, particularly through native habitats, such as grasslands and shrublands, may reduce movement of small animals over these landscapes.

Power lines are another linear feature of the Project that could create barriers to movement. The behavioral reaction of wildlife to power lines may not be the same as the reaction to roads because vegetation and natural ground conditions may be maintained under the power lines. As noted by Richardson et al. (2017), the available literature on the impacts of power lines in non-forested ecosystems is limited. As discussed above, infrastructure can change the landscape for wildlife, possibly changing predator-prey relationships. Transmission towers and distribution poles provide new perching structures for birds (Morelli et al. 2014), a feature that can be limiting in shrub and grassland ecosystems. The availability of these new perching features is postulated to increase predation pressure from raptors and corvids (Richardson et al. 2017), resulting in avoidance of power line corridors by some prey species (Pruett et al. 2009). Power lines and utility poles associated with the Project would provide new perching structures for raptors and corvids, potentially resulting in avoidance of power line rights-of-way by prey species (e.g., herptiles, small mammals, and birds). Behavioral change of large mammals in response to power line corridors can vary, with some species attracted to linear features as a source of forage or movement, while others avoid these features. Leu et al. (2011) did not observe avoidance of power line corridors by pronghorn antelope.

Habitat Fragmentation

Anthropogenic changes to the landscape, such as removal of native vegetation, creation of linear features, and development of infrastructure, can fragment ecosystems, resulting in a patchwork of smaller native vegetation communities dispersed among altered habitats. Habitat fragmentation is linked to barriers to movement. The Project would generally be situated on a landscape that has been fragmented by agriculture, urban development, and roads. The Project is predicted to result in new fragmentation where Project components bisect native shrub-steppe habitat, predominantly along the northern boundary of the Lease Boundary. Further fragmentation may occur where roads and other ground disturbance is proposed over canyons and draws.

The operation of turbines, solar arrays, power lines, roadways, and other infrastructure could result in barriers to wildlife movement and fragmented habitat. Barriers and fragmentation created during construction would predominantly remain through operation. Operation of the comprehensive Project operation is predicted to have a medium impact on barriers to wildlife movement and habitat fragmentation that is long term, probable, and confined to the Lease Boundary.

4.6.2.3 Impacts during Decommissioning

Impacts associated with decommissioning would be similar to impacts identified during Project construction (Section 4.6.2.1). General potential impacts from decommissioning are described below and characterized by Project components in subsequent sections.

Turbine Option 1 and Turbine Option 2

Habitat Loss from Decommissioning of Turbines

The Project would result in temporary loss of habitat during decommissioning of Turbine Option 1 and Turbine Option 2. No new permanent habitat loss is expected, and restoration activities are expected to replace and/or enhance habitat loss created during construction and operation. Decommissioning under Turbine Option 1 and Turbine Option 2 is predicted to have a negligible impact on habitat loss that is short term, unavoidable, and local to within 0.4 miles of decommissioning areas.

Wildlife Mortality from Decommissioning of Turbines

Sources of wildlife injuries and mortalities during decommissioning include collisions with equipment; removal of nuisance wildlife; destruction of nests, dens, and burrows; and habitat loss. The risk of mortalities would be limited to the duration of decommissioning. Turbine decommissioning under Turbine Option 1 and Turbine Option 2 is predicted to have a negligible impact on wildlife mortality that is short term, feasible, and confined to the Lease Boundary.

Barriers to Movement and Habitat Fragmentation from Decommissioning of Turbines

Decommissioning would remove Project-related barriers to movement and reduce habitat fragmentation by removing infrastructure and revegetating disturbed areas. Decommissioning of turbines is predicted to have a negligible impact on barriers to wildlife movement and habitat fragmentation that is short term, feasible, and confined to the Lease Boundary.

Solar Arrays

Habitat Loss from Decommissioning of Solar Arrays

The Project would result in temporary loss of habitat during decommissioning of solar arrays. No new permanent habitat loss is expected, and restoration activities are expected to replace and/or enhance habitat loss created during construction and operation. Solar array decommissioning is predicted have a negligible impact related to habitat loss that is short term, unavoidable, and confined to the solar array fields, access roads, and ancillary facilities.

Wildlife Mortality from Decommissioning of Solar Arrays

Sources of wildlife injuries and mortalities during decommissioning include collisions with equipment; removal of nuisance wildlife; destruction of nests, dens, and burrows; and habitat loss. The risk of mortalities would be limited to the duration of decommissioning. Decommissioning of the solar arrays is predicted to have a negligible impact on wildlife mortality that is short term, feasible, and confined to the Lease Boundary.

Barriers to Movement and Habitat Fragmentation from Decommissioning of Solar Arrays

Decommissioning would remove Project-related barriers to movement and reduce habitat fragmentation by removing infrastructure and revegetating disturbed areas. Decommissioning of the solar arrays is predicted to have a negligible impact resulting in barriers to wildlife movement and habitat fragmentation that is short term, feasible, and confined to the Lease Boundary.

Battery Energy Storage Systems

Habitat Loss from Decommissioning of BESSs

The Project would result in temporary loss of habitat during decommissioning of BESSs. No new permanent habitat loss is expected, and restoration activities are expected to replace and/or enhance habitat loss created during construction and operation. Decommissioning of the BESSs is predicted to have a negligible impact resulting in habitat loss that is short term, unavoidable, and limited to the BESS areas.

Wildlife Mortality from Decommissioning of BESSs

Sources of wildlife injuries and mortalities during decommissioning include collisions with equipment; removal of nuisance wildlife; destruction of nests, dens, and burrows; and habitat loss. The risk of mortalities would be limited to the duration of decommissioning. Decommissioning of the BESSs is predicted to have a negligible impact on wildlife mortality that is short term, feasible, and confined to the Lease Boundary.

Barriers to Movement and Habitat Fragmentation from Decommissioning of BESSs

Decommissioning would remove Project-related barriers to movement and reduce habitat fragmentation by removing infrastructure and revegetating disturbed areas. Decommissioning of the BESSs is predicted to have a negligible impact resulting in barriers to wildlife to movement and habitat fragmentation that is short term, feasible, and limited to the BESS areas.

Substations

Habitat Loss from Decommissioning of Substations

The Project would result in temporary loss of habitat during decommissioning of substations. No new permanent habitat loss is expected, and restoration activities are expected to replace and/or enhance habitat loss created during construction and operation. Decommissioning of the substations is predicted to have a negligible impact resulting in habitat loss that is short term, unavoidable, and limited to the substation areas.

Wildlife Mortality from Decommissioning of Substations

Sources of wildlife injuries and mortalities during decommissioning include collisions with equipment; removal of nuisance wildlife; destruction of nests, dens, and burrows; and habitat loss. The risk of mortalities would be limited to the duration of decommissioning. Decommissioning of the substations is predicted to have a negligible impact on wildlife mortality that is short term, feasible, and confined to the Lease Boundary.

Barriers to Movement and Habitat Fragmentation from Decommissioning of Substations

Decommissioning would remove Project-related barriers to movement and reduce habitat fragmentation by removing infrastructure and revegetating disturbed areas. Decommissioning of the substations is predicted to have a negligible impact related to barriers to wildlife movement and habitat fragmentation that is short term, feasible, and limited to the substation areas.

Comprehensive Project

Habitat Loss from Decommissioning of Comprehensive Project

Some temporary disturbance of habitat is expected to be required during Project decommissioning to facilitate removal of the infrastructure. These losses are described in Section 4.5.2.3. No new permanent habitat loss is expected during the decommissioning stage. The duration of temporary habitat loss would be limited to the timeframe during which the decommissioning and restoration activities would occur.

Revegetation of areas associated with temporary, modified, and permanent disturbance would be conducted during the decommissioning stage. Revegetation of areas of shrub-steppe habitat lost during construction and operation would have a positive effect on wildlife from operational conditions, and revegetation could have a positive impact on wildlife by re-establishing native habitat types and habitat connectivity in areas previously dominated by agriculture.

Noise and disturbance associated with decommissioning activities are also expected to be similar to impacts described for the construction stage. Wildlife are expected to be temporarily displaced due to increased visual and noise disturbances during infrastructure removal. These impacts are predicted to be short term and would end once decommissioning activities are complete.

Removal of infrastructure could change available habitat for species that had adapted to site conditions associated with Project features. For example, removal of transmission poles may result in a reduction of perching and nesting habitat for guilds, such as raptors, that have adapted to using these features. Similarly, if smaller mammals have adapted to using solar arrays as shelter, removing these features may reduce shelter sites for smaller animals.

The Project would result in temporary loss of habitat during decommissioning of the comprehensive Project. No new permanent habitat loss is expected, and restoration activities are expected to replace and/or enhance habitat loss created during construction and operation. Decommissioning of the comprehensive Project is predicted to have a negligible impact resulting in habitat loss that is short term, unavoidable, and local to within 0.4 miles of decommissioning areas.

Wildlife Mortality from Decommissioning of Comprehensive Project

Sources of wildlife injuries and mortality during decommissioning are expected to be similar to construction-stage activities, including collisions with equipment, removal of nuisance wildlife, destruction or failure of nests, destruction of dens and burrows, and habitat loss. The risk of mortality would be limited to the duration of decommissioning

Sources of wildlife injuries and mortalities during decommissioning include collisions with equipment; removal of nuisance wildlife; destruction of nests, dens, and burrows; and habitat loss. The risk of mortalities would be limited to the duration of decommissioning. Decommissioning of the comprehensive Project is predicted to have a negligible impact on wildlife mortality that is short term, feasible, and confined to the Lease Boundary.

Barriers to Movement and Habitat Fragmentation from Decommissioning of Comprehensive Project

Decommissioning would remove Project-related barriers to movement and reduce habitat fragmentation by removing infrastructure and revegetating disturbed areas. Decommissioning of the comprehensive Project is predicted to have a negligible impact resulting in barriers to wildlife movement and habitat fragmentation that is short term, feasible, and confined to the Lease Boundary.

4.6.2.4 Special Status Species

This section describes the predicted impacts on special status species from the construction, operation, and decommissioning of the Micrositing Corridor, solar arrays, BESSs, substations, and other supporting infrastructure. The predicted impacts from the comprehensive Project from the three stages are described collectively under the species-specific heading. The Lease Boundary may support 20 special status species. Special status species may be less resilient to habitat loss, habitat change, or changes in population due to the existing pressures on the populations in the baseline case. The following sections describe the potential Project-related impacts on special status wildlife species that may have deviated from the descriptions of impacts provided in the preceding sections. Individual impact ratings for special status species have been provided in the impact summary tables, **Table 4.6-10a** through **Table 4.6-10c**. Pronghorn antelope is also included in this section. While not considered a special status species, pronghorn antelopes are understood to be of special importance to the Yakama Nation and are the subject of a regional re-introduction program.

Sagebrush Lizard and Striped Whipsnake

As noted by the Applicant, while sagebrush lizards (*Scleoporus graciuosus*) have not been recorded within the Lease Boundary, suitable habitat for the species is available in the area (Horse Heaven Wind Farm, LLC 2021a). Striped whipsnake (*Coluber taeniatus*) has also not been documented in the Lease Boundary, and the Applicant reports that suitable hibernacula are not available in this location; however, Gap Analysis Project (GAP) data classify portions of the Lease Boundary as year-round habitat. Shrub-steppe, rabbitbrush, and grassland may be impacted by the Project, resulting in a loss of potentially suitable sagebrush lizard and striped whipsnake habitat (**Table 4.6-6**). Agricultural areas that would be modified under the solar facility could be used as thermoregulatory or shelter sites by reptiles; however, the response of reptiles to these facilities is unknown.

Table 4.6-6: Potential Loss of Sagebrush Lizard and Striped Whipsnake Habitat

Habitat Type	Temporary Disturbance (acres)	Permanent Disturbance (acres)	Modified Habitat (acres)
Eastside (Interior) Grassland	17	5	72.5
Non-native Grassland	137	13	24.7
Planted Grassland	263	33	215.3
Dwarf Shrub-steppe	9	1	0
Rabbitbrush Shrubland	154	49	706.1
Sagebrush Shrub-steppe	31.1	1	0.3

Source: Horse Heaven Wind Farm, LLC 2021b; Tetra Tech 2021a
Notes: Calculations of areas were completed independently using spatial files provided by the Applicant.

There is a lack of data on behavioral changes in reptiles due to wind farms. Potential effects on sagebrush lizard and striped whipsnake are extrapolated from studies on other reptiles, where information exists. In a study on changes in side-blotched lizard (*Uta stansburiana*) populations in response to wind farms in California, Keehn et al. (2019) concluded that wind farms did not notably influence species demography or behavior. However, this study did find that the species avoided areas of dense roads. Similarly, sagebrush lizard and striped whipsnake may not avoid habitat around turbines but could avoid new access roads developed for the Project. Reptiles could be attracted to solar arrays, as these areas could provide shelter from predation by raptors. Further, it is possible that solar arrays may provide areas of thermoregulation.

Reptiles are vulnerable to road-based mortality (Row et al. 2007). Increased road networks in the Lease Boundary can increase the risk of mortality for sagebrush lizard and striped whipsnake; however, operational traffic levels are expected to be minimal. Therefore, a substantially increased risk to sagebrush lizard and striped whipsnake is not expected.

Impacts from Project construction (Turbine Options 1 and 2, solar arrays, BESSs, substations, and the comprehensive Project) are predicted to have a low impact on sagebrush lizard and striped whipsnake that is constant, feasible, and confined within 0.5 miles of infrastructure. Impacts initiated in construction would predominantly persist through operation and are predicted to be low magnitude, constant, and may feasibly occur within 0.5 miles of infrastructure. Impacts from decommissioning for all components and the comprehensive Project are predicted to be negligible, short term, feasible, and confined.

American White Pelican

The Applicant reports that the Lease Boundary does not provide suitable foraging or resting habitat for the American white pelican, though a resident population occurs within 4 miles of the Lease Boundary (Horse Heaven Wind Farm, LLC 2021a). Suitable habitat is mapped to the north and east of the Lease Boundary, along the Columbia River (Horse Heaven Wind Farm, LLC 2021d). The Project is not expected to result in direct or indirect loss of American white pelican habitat.

American white pelicans were observed during field surveys flying over the Lease Boundary near the Columbia River. The Applicant reported that American white pelicans are predicted to be the fifth most likely bird to collide with Project infrastructure. However, the Applicant has since removed the eastern portion of the proposed Project, which is expected to reduce the potential for American white pelicans to strike turbines. Further, the Applicant reports that no mortalities of this species have been recorded at the nearby Nine Canyon Wind Project. Exposure indices for American white pelican are similar for all turbine technologies, ranging from 0.289 for Option 1 technologies to 0.303 for Option 2 technologies. Given that Option 1 would require more turbines than Option 2, it is predicted to result in a greater collision risk for American white pelicans.

Water-associated birds are susceptible to mortality at solar facilities. These species may misperceive solar arrays as waterbodies and attempt to land on them (i.e., the lake effect), resulting in injury and mortality.

Water-associated birds have been reported to avoid wind farms potentially being displaced over 0.3 miles (600 meters) (Larsen and Madsen 2000; Rees 2012). With the removal of the eastern portion of the Project prior to submission of the ASC, turbines are not expected to be situated within 0.3 miles of suitable American white pelican habitat; therefore, potential barriers to American white pelican are predicted to be limited.

Project construction (Turbine Options 1 and 2, solar arrays, BESSs, substations, and the comprehensive Project) is predicted to have a negligible impact on the American pelican that is short term, unlikely to occur, and limited in extent. During operation of the turbines (Options 1 and 2), solar arrays, and comprehensive Project impacts on the American pelican are predicted to be medium magnitude, long term, unlikely to occur, and confined. Operation of the BESSs and substations is not predicted to interact with American white pelicans, resulting in a negligible magnitude. Impacts from decommissioning for all components and the comprehensive Project are predicted to be negligible, short term, unlikely to occur, and confined.

Bald Eagle

The Applicant reported six bald eagle (*Haliaeetus leucocephalus*) territories within 10 miles of the Lease Boundary, all but one of which were active during at least one survey round. Nest sites were approximately 3.7 to 10.7 miles from the location of the proposed turbines. Although territories were recorded near the Project location, the Applicant notes that bald eagle occurrence within the Lease Boundary is low and that there is little suitable habitat for this species, such as suitable foraging waterbodies and nesting trees, within the Lease Boundary. Based on the lack of nesting observed within the Lease Boundary and the limited observations of bald eagles during surveys, it is expected that the Project would not remove important or unique bald eagle habitat. Further, Project turbines would be located over 3.7 miles from the closest nest, and the ZOI applied to the Project is not predicted to overlap with known bald eagle nest sites.

The Applicant estimates that bald eagles are the 17th most likely large bird species to collide with the Project turbines, with an estimated exposure index of 0.01. The Applicant also reports that no bald eagle fatalities have been reported at the nearby Nine Canyon Wind Power Project (Horse Heaven Wind Farm, LLC 2021a). Bald eagles are expected to continue to fly over the Project during operation and would be exposed to a risk of collisions (Horse Heaven Wind Farm, LLC 2021a). The exposure index for bald eagles is approximately 1.1 to 1.3 times greater for Option 2 technologies than Option 1 technologies. There is uncertainty regarding whether the increased risk exposure for Option 2 would be offset by the increased number of turbines proposed in Option 1. Other sources of mortality could include collisions with other infrastructure and vehicles. Bald eagle populations have increased over the past 30 years, and the species has been removed from the federal endangered species list and downgraded in Washington State from threatened to sensitive. Short term population trends are generally considered stable to increasing (Hammerson and Cannings 2022). Given that the population is stable to increasing, bald eagles are considered resilient to minor pressures on population, such as infrequent mortality.

The Project could create a temporary barrier to bald eagle movement during construction and onset of operation because these stages would introduce new disturbances to the landscape. Bald eagles are tolerant of human activity and typically coexist with human development (Hammerson and Cannings 2022) and are expected to adapt to Project operations. Further, based on data provided in the ASC, the Project would not bisect bald eagle nesting and foraging habitat.

Project construction (Turbine Options 1 and 2, solar arrays, BESSs, substations, and the comprehensive Project) are predicted to have a negligible impact on bald eagle that is short term and feasible within the Lease Boundary (confined). During operation Project-related impacts on bald eagle from Turbine Option 1 and 2 and the comprehensive Project are predicted to be low magnitude, long term and feasible in the Lease Boundary (confined). Operation of the solar arrays, BESSs and substations are predicted to have a negligible effect to bald eagle that is long term, feasible, and limited in extent. Impacts from decommissioning for all components and the comprehensive Project are predicted to be negligible, short term, feasible, and confined.

Burrowing Owl

Predictive mapping provided by the Applicant in response to data requests (Horse Heaven Wind Farm, LLC 2021d) characterizes the Lease Boundary as either summer or year-round burrowing owl (*Athene cunicularia*) habitat. The Applicant notes that the Lease Boundary provides suitable foraging and nesting habitat for burrowing owl (Horse Heaven Wind Farm, LLC 2021a). Priority Habitats and Species (PHS) data report 32 burrowing owl nests or burrows within 2 miles of the Lease Boundary, including four within the Lease Boundary (WDFW 2022a). The Applicant notes that removal of shrub-steppe habitat could reduce foraging and nesting habitat (Horse Heaven Wind Farm, LLC 2021a), though burrowing owls can use marginal habitat, such as roadside and agricultural fields. It is predicted that the Project would result in the permanent loss of approximately 51 acres of shrub and 51 acres of grassland habitat. While agricultural habitat is less suitable for burrowing owls, the predicted loss of 489 acres of agricultural habitat associated with the Project is considered to be a reduction in moderate to low suitable habitat. Temporarily disturbed habitat is expected to be restored following construction, and therefore the temporary loss of 194 acres of shrub and 417 acres of grassland may impact burrowing owls during the construction and early operations stages. Modified habitat under solar facilities may continue to provide burrowing owls with habitat, particularly where post-construction remediation may improve plant diversity, such as within existing agricultural land.

In addition to loss of habitat, construction of the Project could damage occupied and suitable unoccupied burrows, reducing the availability of these features on the landscape. Degradation of breeding and wintering habitat, including loss of suitable burrow sites is considered a threat to the species (Poulin et al. 2020).

The Project is not predicted to overlap with the 15 breeding locations reported within 2 miles of the Lease Boundary. The Applicant reports that noise from the Project could disturb burrowing owls nesting in these locations because they are within 0.5 miles of the Project. Surveys for burrowing owls were not conducted as part of the ASC; therefore, it is possible that other burrows may exist within the Lease Boundary. Burrowing owls are generally tolerant of human activity; however, reduced reproductive success has been recorded near construction activities (Poulin et al. 2020). The potential reduction in habitat suitability due to Project-related disturbance has been addressed under “Indirect Habitat Loss,” above.

Burrowing owls typically stay low to the ground during hunting and movement (below 33 feet [10 meters]) (Poulin et al. 2020). Strikes with burrowing owls resulting in mortalities could occur during construction and along access roads during construction and operation. Burrowing owls would be susceptible to construction-related mortality around burrows as machinery could crush adults, young, or eggs in burrow sites. Burrowing owls are not expected to interact with turbines because the rotors would be above the general flight height of this species. New access roads would introduce new sources of mortality, though Project-related traffic through the operation stage is expected to be limited. The Project is not expected to require the use of pesticides or rodenticides, which could lead to ingestion of toxic materials. Changes in prey distribution or density due to Project construction and operation could impact burrowing owl survivorship and recruitment.

New access roads created for the Project would bisect suitable burrowing owl habitat, potentially creating new barriers to movement and further fragmenting burrowing owl habitat.

Long- and short term North American population trends for burrowing owls are predicted to show declines around 30 percent, although the Washington State populations are relatively low, with declines of approximately 1.5 percent annually between 1968 and 2005 (Hammerson and Cannings 2022; Poulin et al. 2020; WDFW 2022b). Based on these trends and the species’ potential tolerance of some human disturbance, the population is not predicted to be resilient to habitat and population pressures.

Construction of the Project (Turbine Options 1 and 2, solar arrays, BESSs, substations, and comprehensive Project) is predicted to have a medium impact on burrowing owls that is constant for burrowing owl habitat loss but short term for burrowing owl mortality and disturbance. Habitat loss during construction is assessed as unavoidable, while disturbance to burrowing owls is probable and mortality is feasible. Impacts are considered confined to the Lease Boundary.

Operation of turbines and the comprehensive Project is predicted to have a medium-magnitude, constant impact on burrowing owls that are unavoidable and confined to the Project Lease Boundary. Impacts from operation of the solar arrays, BESSs, and substations are predicted to be medium magnitude, constant, feasible, and confined to the Lease Boundary. Impacts from decommissioning for all components and the comprehensive Project are predicted to be negligible, short term, unlikely, and confined.

Ferruginous Hawk

Ferruginous hawks (*Buteo regalis*) have been documented foraging and nesting within and near the Lease Boundary. Nine ferruginous hawk nests were documented within 2 miles of the proposed turbine locations, two of which were occupied at least once over the three-year period during which the Applicant conducted surveys

(Horse Heaven Wind Farm, LLC 2021a). PHS data document 41 ferruginous hawk nests within 2 miles of the Lease Boundary, including 10 within the Lease Boundary (WDFW 2022a). One of the active nests was recorded approximately 0.5 miles from an area of temporary disturbance associated with construction of a turbine pad. Ferruginous hawks were recorded infrequently in the Lease Boundary. It is expected that ferruginous hawks nesting near the Project may forage in the Lease Boundary. Project-related losses of shrub, grassland, and agricultural habitat that could support small mammal populations are considered a reduction in potential foraging habitat for the ferruginous hawk. Direct habitat loss estimates are provided in **Table 4.6-7** and are estimated based on the ferruginous hawk's 2-mile core habitat and the 6-mile range habitat (areas measured as a radius around the two active nests). Direct habitat loss within 2 miles (measured as a radius from the nest) of historical nest locations may reduce the capacity for these areas to be reoccupied in the future. Loss and degradation of ferruginous hawk habitat leading to fewer breeding locations, and loss of habitat that supports prey items, both affect the persistence of the species in Washington State (Hayes and Watson 2021).

Table 4.6-7: Potential Direct Loss of Ferruginous Hawk Habitat

Habitat Type	Core Habitat (acres)	Range Habitat (acres)
Agriculture	260	6,271.6
Developed/Disturbed	0.6	21.1
Dwarf Shrub-steppe	0	10.0
Eastside (Interior) grassland	8.3	80.4
Grassland	0.1	<0.1
Non-native Grassland	10.5	121.7
Planted Grassland	54.5	423.9
Rabbitbrush Shrubland	20.8	854.5
Sagebrush Shrub-steppe	5.3	17.0
Shrubland	0	<0.1

Source: Horse Heaven Wind Farm, LLC 2021b; Tetra Tech 2021a
Notes: Calculations of areas were completed independently using spatial files provided by the Applicant.

Estimating Project-related indirect loss of ferruginous hawk habitat is challenging because this species displays some tolerance of wind power projects in the short term (Watson et al. 2018); however, long term monitoring of continued territory occupancy is not well studied. Watson et al. (2018) note that while breeding pairs currently occupying territories near wind farms may continue to occupy those territories, this behavior may not reflect future recruitment of birds into territories near wind farms. This is consistent with the results of a study conducted in the Columbia Plateau Ecoregion that reported a decline in ferruginous hawk nest success with increased wind turbines in the bird's home range buffer (7,907 acres) (Kolar and Bechard 2016). The Applicant notes that the Project could result in a reduction of ferruginous hawk territory occupancy and nesting success, as well as modification of foraging habitat (Horse Heaven Wind Farm, LLC 2021a). These changes could result in the species' abandonment of the territory in and adjacent to the Project in the long term. **Table 4.6-8** provides a summary of available habitat within the ferruginous hawk core habitat and range habitat that may be indirectly impacted by the Project. Refinement of potential indirect loss estimates would require additional data regarding the foraging patterns specific to the pair currently occupying the territory in the Lease Boundary.

Table 4.6-8: Potential Indirect Loss of Ferruginous Hawk Habitat

Habitat Type	Core Habitat (acres)	Range Habitat (acres)
Agriculture	3905.9	32,051.8
Developed/Disturbed	21.6	587.6
Dwarf Shrub-steppe	0	13.3
Eastside (Interior) Grassland	8.3	76.5
Grassland	458.1	3736.3
Non-native Grassland	165.3	1179.4
Planted Grassland	515.2	2586.8
Rabbitbrush Shrubland	107.1	1563.4
Sagebrush Shrub-steppe	84.8	259.6
Shrubland	273.4	796.2

Source: Horse Heaven Wind Farm, LLC 2021b; Tetra Tech 2021a
Notes: Calculations of areas were completed independently using spatial files provided by the Applicant.

Ferruginous hawks may become tolerant of wind farms constructed within their territories and have been reported to continue to forage between turbines during operation (Watson et al. 2018). This behavior may increase the risk of collision with turbines as they move between the structures. The Applicant notes that five wind-farm-related ferruginous hawk fatalities have been recorded in the Pacific Region (Horse Heaven Wind Farm, LLC 2021d) and has estimated ferruginous hawks to have an exposure index of <0.1, ranking them as the 24th most likely species to collide with the turbines. While the exposure index calculated for this species is low, Hayes and Watson (2021) report that the local (Benton and Franklin Counties) and state-wide populations are in substantial decline.

The exposure index for ferruginous hawks is approximately 1.3 times greater for Turbine Option 1 (GE 3.03-MW) than for the other three turbine technologies (GAL 2022; **Appendix 4.6-1**). In addition, Option 1 also requires a larger number of turbines, and therefore, it is expected that this option would result in a greater collision risk for ferruginous hawks (GAL 2022).

Changes in prey and bird community structures may also impact ferruginous hawks. Changes in density of prey (e.g., ground squirrel, rabbit) due to the Project could impact survivorship of adults and young. Prey density could be altered by Project-related habitat loss, barriers to movement, and changes in available shelter sites under solar arrays that could reduce hunting success. In addition, development of wind farms can change the composition of bird communities (Falavigna et al. 2020), potentially resulting in an increase in other raptor or corvid species that compete with ferruginous hawk for resources. For example, Kolar and Bechard (2016) noted that turbines changed the nesting success of ferruginous hawk but found no changes to the nesting success of more common Buteo species (red-tailed hawk [*Buteo jamaicensis*] and Swainson's hawk [*Buteo swainsoni*]). Similarly, corvid populations may also have a positive response to the Project as it can create more nesting and perching opportunities on the transmission structures and power poles. These species may compete with the ferruginous hawk for resources potentially impacting nesting success and adult survivorship.

The Project is not predicted to require the use of pesticides or rodenticides, which could further impact prey populations or bioaccumulate in hawks through prey consumption.

The ferruginous hawk population is declining in the baseline case due to mortality and habitat loss, and therefore, the local population may not be resilient to loss of individuals and habitat. Further, development within suitable ferruginous hawk habitat, including territories not currently occupied, may impact the recovery of the species by limiting habitat availability for recruitment of new nesting pairs.

Construction of Turbine Options 1 and 2, BESSs, substations, and comprehensive Project is predicted to have a high-magnitude impact on ferruginous hawks that is constant and unavoidable for habitat loss, and short term and probable for disturbance. These construction impacts are predicted to be confined to the Project Lease Boundary. Construction of the solar arrays is predicted to have a medium-magnitude, constant, unavoidable impact on ferruginous hawks that is limited in extent. Operation of the turbines (Options 1 and 2) and comprehensive Project is predicted to result in a high-magnitude, constant impact that may feasibly occur within the Project Lease Boundary (confined). Operation of the solar arrays is predicted to have a medium-magnitude, constant impact that may feasibly occur within the Project Lease Boundary (confined). Operation of the BESSs and substations is predicted to have a negligible impact that is constant, unavoidable, and limited in extent. Impacts from decommissioning for all components and the comprehensive Project are predicted to be negligible, short term, feasible, and confined.

Golden Eagle

The Lease Boundary does not overlap predicted golden eagle (*Aquila chrysaetos*) breeding habitat (NatureMapping n.d.); however, the Applicant reports that suitable nesting habitat occurs along cliffs adjacent to the Columbia River (Horse Heaven Wind Farm, LLC 2021a). Watson et al (2014) suggested that golden eagle nesting may be impacted by wind farms within 8 miles of nesting sites. The Applicant reports that golden eagle nests were not observed within 10 miles of the Lease Boundary. Therefore, the Project is not expected to result in indirect loss or degradation of suitable golden eagle nesting habitat because occupancy of this habitat type has not been observed. Golden eagles were observed flying over and perching within the Lease Boundary and could forage on small mammals in the Lease Boundary. The Project may result in direct and indirect foraging habitat loss, though foraging habitat is not expected to be limited on the landscape or a limiting factor to golden eagle populations.

The Applicant has predicted that the golden eagle is the 22nd most likely large bird species to collide with the Project. While collisions may not be predicted as likely, the Applicant notes that golden eagles are predicted to continue to use the Lease Boundary during Project operation, and as a result, the Project would pose a risk of mortality due to collision. The exposure index for golden eagles under Option 1 (GE 2.82-MW and GE 3.03-MW turbines) is approximately 1.2 times greater than Option 2 (SG 5.5-MW turbine), but the same as the Option 2 SG 6.0-MW turbine proposed for Option 2. Because Option 1 would also require a greater number of turbines than Option 2, it is expected to result in a greater collision risk for golden eagles.

Changes in prey availability due to loss of habitat or loss of access could contribute to impacts on golden eagles' survivorship. The Applicant has not proposed the use of rodenticides that could contribute to reduction of prey and consumption of poisons by eagles.

Golden eagle populations in western North America are predicted to be stable or slightly declining (Hammerson and Cannings 2022; Katzner et al. 2020). Declines are predicted to be associated with loss of shrub and jackrabbit habitat (Katzner et al. 2020). The Project is predicted to contribute to the threats to this species due to loss of prey base and mortality. As the regional populations may be stable or slightly declining, they are expected to be moderately resilient to Project-related stresses resulting from habitat loss and mortality.

Construction of the Project (Turbine Options 1 and 2, solar arrays, BESSs, substations, and comprehensive Project) is predicted to have a negligible impact on golden eagles that is short term, unlikely to occur, and confined to the Project Lease Boundary. Operation of the turbines (Options 1 and 2) and comprehensive Project is predicted to have a medium-magnitude, long term impact on golden eagles that may feasibly occur within the

Project Lease Boundary (confined). Operation of the solar arrays, BESSs, and substations is predicted to have a negligible, long term impact on golden eagles that is unavoidable and confined to the Project Lease Boundary. Impacts from decommissioning for all components and the comprehensive Project are predicted to be negligible, short term, unlikely, and confined.

Great Blue Heron

One great blue heron (*Ardea herodias*) was observed flying within the Lease Boundary during the field studies (Horse Heaven Wind Farm, LLC 2021a). Great blue herons are year-round residents within the Lease Boundary. Suitable nesting habitat is unlikely to occur within the Lease Boundary; however, nesting may occur near the Columbia and Yakima Rivers. Suitable foraging habitat within the Lease Boundary for great blue heron includes agricultural fields, grasslands, and shrubland (Horse Heaven Wind Farm, LLC 2021a). Permanent disturbance would directly impact approximately 489 acres of agricultural land, 51 acres of grasslands, and 51 acres of shrubland.

Threats to great blue heron typically include contamination of food sources, alteration of foraging habitat (e.g., draining wetlands), and disturbance of nesting sites. As suitable nesting areas are not available within the Lease Boundary, indirect impacts, such as sensory disturbance, on nesting areas are not anticipated. In addition, since impacts on wetlands are not anticipated during Project operations, potential wetland foraging habitat would be unaffected. Other types of foraging habitats are available in agricultural land, grassland, and shrubland that surrounds the Project footprint, and as a result, great blue herons may avoid some of these foraging areas during Project operations due to sensory disturbance. During the breeding season, adult herons typically remain within approximately 6.2 miles (10 kilometers) of the nest but may use home ranges up to 18.6 miles (30 kilometers) (Vennesland 2004). The ZOI described above would account for the foraging habitat loss that may be an indirect impact from the Project.

The mean exposure index for great blue herons is estimated to be <0.001 for Option 1 turbines and <0.0001 for Option 2 turbines (GAL 2022; Horse Heaven Wind Farm, LLC 2021a). Fatalities of great blue heron have been documented at wind turbines in Washington State, including one at the adjacent Nine Canyon Wind Farm (Horse Heaven Wind Farm, LLC 2021a). Five fatalities have been documented at wind turbines in the United States. (AWWI 2020). Mortality of individuals is possible during Project operations (Horse Heaven Wind Farm, LLC 2021a). Given that Option 1 would require more turbines than Option 2, Option 1 is expected to result in a greater risk of impacts on great blue heron (GAL 2022; **Appendix 4.6-1**).

Populations in southern Washington State are predicted to be declining, potentially by more than 1.5 percent per year (Vennesland and Butler 2020). Other regional populations may be stable or increasing. The population may be stable or slightly declining and is expected to be moderately resilient to imposed stresses. The Project is not predicted to substantially contribute to habitat loss or mortality of great blue heron.

Construction of the Project (Turbine Options 1 and 2, solar arrays, BESSs, substations, and comprehensive Project) is predicted to have a negligible impact on great blue herons that is long term and unavoidable for habitat loss and short term and feasible for disturbance and mortality. Construction impacts are expected to be confined to the Project Lease Boundary. During operation of the turbines (Options 1 and 2) and comprehensive Project, impacts are predicted to have a medium magnitude, long term impact on great blue herons that may feasibly occur within the Project Lease Boundary (confined). Operation of the solar arrays, BESSs, and substations is predicted to have a negligible, long term impact on great blue herons that is unavoidable and confined to the

Project Lease Boundary. Impacts from decommissioning for all components and the comprehensive Project are predicted to be negligible, short term, feasible, and confined.

Loggerhead Shrike

One loggerhead shrike (*Lanius ludovicianus*) was observed during field surveys (Horse Heaven Wind Farm, LLC 2021a). The PHS database reports seven loggerhead shrike occurrences within 2 miles of the Lease Boundary, three of which are nest sites (WDFW 2022a). Five of the loggerhead shrike occurrences are reported from within the Lease Boundary, two of which are nest locations. Nesting habitat is available within the Lease Boundary in hedgerows, around abandoned homesteads, and on shrubland (Horse Heaven Wind Farm, LLC 2021a). Species-specific surveys for loggerhead shrike were not conducted for the Project (Horse Heaven Wind Farm, LLC 2021a). Permanent disturbance would directly impact approximately 51 acres of grasslands and 51 acres of shrubland. An additional 706.4 acres of shrubland would be converted to low-growing grassland as modified habitat under solar arrays, which would further reduce nesting habitat.

Loggerhead shrikes are associated with shrub-steppe ecosystems and usually nest within shrubs (Johnson and O'Neil 2001). Shrubs are also used by loggerhead shrikes for singing and foraging perches, although they generally avoid foraging in dense areas of cheatgrass (*Bromus tectorum*) (Johnson and O'Neil 2001). In addition, nesting sites may be selected near ground squirrel burrows because of their influence on vegetation and landscape (Smallwood and Smallwood 2021). Project construction could result in reduced material available for nesting and may impact ground squirrel populations, which could have indirect impacts on nesting loggerhead shrikes (Smallwood and Smallwood 2021).

Loggerhead shrikes require larger nesting territories due to the species' predatory behavior (Smallwood and Smallwood 2021); therefore, habitat fragmentation from the Project could impact the number of breeding pairs in the Lease Boundary. In addition, further degradation of the remaining patches of shrubland from potential spread of invasive plants may further reduce habitat availability. For example, cheatgrass is a common invasive plant throughout the Lease Boundary, and further spread of this species would degrade the remaining native habitat for loggerhead shrikes.

One fatality of a similar species, the northern shrike (*Lanius borealis*), has been documented at a wind facility in Washington State (Horse Heaven Wind Farm, LLC 2021a), and 13 loggerhead shrike fatalities have been reported for wind facilities across the United States (AWWI 2020). Fatalities of loggerhead shrikes at wind turbines in the Altamont Pass Wind Resource Area averaged 10.6 per year once the new generation turbines were installed, which represents a reduction from 93.4 per year when the old-generation turbines were operating (Smallwood and Smallwood 2021). Based on surveys within the Lease Boundary, loggerhead shrikes are anticipated to occur during Project operations (Horse Heaven Wind Farm, LLC 2021a). Certain behaviors of loggerhead shrikes may increase susceptibility to turbine strikes, such as hovering and kiting in high winds and in updrafts to search for prey, similar to hawks. These updrafts often occur at the top of slopes, which also often correspond with the siting of wind turbines (Smallwood and Smallwood 2021). Loggerhead shrikes also display chasing behavior, often chasing other birds for several hundreds of yards, which can distract them from surrounding threats such as wind turbines (Smallwood and Smallwood 2021).

Because of the species' occurrence in the Lease Boundary, combined with its behavioral traits and considering the records of strikes at wind turbine facilities, Project operations are anticipated to result in fatalities. The Applicant did not provide an exposure index for loggerhead shrikes; therefore, it is expected that Option 1, which would involve a greater number of turbines than Option 2, would likely result in a higher risk to loggerhead shrikes (GAL 2022; **Appendix 4.6-1**).

Loggerhead shrike populations are estimated to be declining approximately 3.5 to 5 percent per year (Yosef 2020), although the rate of decline varies across regions. The Project is predicted to contribute to the loss of suitable loggerhead shrike foraging and nesting habitat and may pose some risk of mortality. Loggerhead shrike populations are expected to be moderately resilient to imposed stresses.

Construction of the Project (Turbine Options 1 and 2, solar arrays, BESSs, substations, and comprehensive Project) is predicted to have a low-magnitude impact on loggerhead shrikes that is constant and unavoidable for habitat loss and short term and probable for disturbance and mortality. Construction impacts are expected to be confined to the Project Lease Boundary. During operation of the turbines (Options 1 and 2) and comprehensive Project, impacts are predicted to have a medium-magnitude, constant, unavoidable impact on loggerhead shrikes within the Project Lease Boundary (confined). Operation of the solar arrays is predicted to have a low-magnitude, constant, unavoidable impact on loggerhead shrikes that is confined to the Project Lease Boundary. Operation of the BESSs and substations is predicted to result in a negligible, constant, unavoidable impact that is confined to the Project Lease Boundary. Impacts from decommissioning for all components and the comprehensive Project are predicted to be negligible, short term, feasible, and confined.

Prairie Falcon

The Lease Boundary may overlap core prairie falcon (*Falco mexicanus*) breeding habitat (NatureMapping n.d.); however, suitable nesting habitat occurs on bluffs and canyons within the Lease Boundary, and nests were reported within 5 miles of the Lease Boundary. PHS data report 12 occurrences of prairie falcon within 2 miles of the Lease Boundary, though none within the Lease Boundary (WDFW 2022a). Nine of the occurrences are nest sites. The Applicant reports prairie falcons hunting and perching in cropland and grassland, and it is expected that most of the Lease Boundary could provide suitable hunting habitat, though agricultural areas are of lower quality than native range (Steenhof 2020). Therefore, the Project is predicted to result in the permanent loss of approximately 102 acres (51 acres of grasslands and 51 acres of shrubland) of potential foraging habitat for this species. While loss and degradation of foraging habitat is considered a threat to the species, nesting habitat is generally a more limiting feature for prairie falcon than foraging habitat (Steenhof 2020). Active nests were not recorded within the Lease Boundary. In addition to direct habitat loss, the Project may disturb prairie falcons foraging in the Lease Boundary. Additional foraging habitat may be indirectly lost around turbines and other Project features.

Prairie falcons are predicted to be the 21st most likely large bird species to collide with turbines (exposure indices from 0.003 to 0.01, depending on the technology option selected). Two prairie falcon mortalities have been reported from wind farms in Washington State (Horse Heaven Wind Farm, LLC 2021a). Prairie falcons were reported to be most abundant in the Lease Boundary during the fall and winter, when the species would be at greatest risk for collision. Given that the risk of collision with turbines during the summer is considered low based on species observation during field surveys, the risk of the Project-related collision mortalities resulting in nest failure or impacts on fledglings is considered low.

Exposure indices for prairie falcons are 1.2 to 3.3 times greater for Option 1 than Option 2, and because Option 1 would also require a greater number of turbines than Option 2, it is expected to result in greater collision risk for prairie falcons (GAL 2022; **Appendix 4.6-1**).

Changes in abundance of or access to prey (e.g., ground squirrels, horned lark) may also impact the survival of prairie falcons. The Applicant does not propose using rodenticides or pesticides that may be consumed by prey species; however, changes to prey occupancy of the Lease Boundary (e.g., avoidance or increased shelter under solar arrays) could impact prairie falcon hunting, resulting in changes in survivorship.

Short term trends suggest that the North American prairie falcon population is stable (Hammerson and Cannings 2022), though populations in western North America may be declining (Steenhof 2020). Given that the populations may be stable or in slight decline, they are predicted to be moderately resilient to the impacts of the Project.

Construction of the Project (Turbine Options 1 and 2, solar arrays, BESSs, substations, and comprehensive Project) is predicted to have a medium-magnitude impact on prairie falcons that is constant and unavoidable for habitat loss and short term and probable for disturbance and mortality. Construction impacts are expected to be confined to the Project Lease Boundary. During operation of the turbines (Options 1 and 2) and comprehensive Project, impacts are predicted to have a medium-magnitude, constant, unavoidable impact on prairie falcons within the Project Lease Boundary (confined). Operation of the solar arrays is predicted to have a low-magnitude, constant, feasible effect on prairie falcons that is confined to the Project Lease Boundary. Operation of the BESSs and substations is predicted to result in a negligible, constant, unavoidable impact that is limited in extent. Impacts from decommissioning for all components and the comprehensive Project are predicted to be negligible, short term, unlikely, and confined.

Ring-necked Pheasant

Ten observations of ring-necked pheasants (*Phasianus colchicus*) were recorded within the Lease Boundary during field surveys for the Project (Horse Heaven Wind Farm, LLC 2021a). PHS data report 10 occurrences within 2 miles of the Lease Boundary (WDFW 2022a). Ring-necked pheasant is native to Asia, but populations were introduced to North America. Breeding habitat includes most open habitats in eastern Washington. This species is highly adaptable and uses a variety of habitats. Benton County is within a pheasant management zone, and agricultural and grassland habitat in the Lease Boundary is expected to provide habitat for ring-necked pheasants (Horse Heaven Wind Farm, LLC 2021a). The Project would result in permanent disturbance of 489 acres of agricultural land and 51 acres of grasslands, which could provide habitat for ring-necked pheasants.

Ring-necked pheasants could be indirectly impacted from Project operations. Ring-necked pheasants experience high road mortality, particularly in April and May (Giudice and Ratti 2020). The Project would result in an increase in permanent roads within the Lease Boundary, with the addition of 107.3 miles of access roads within the Lease Boundary (Horse Heaven Wind Farm, LLC 2021a). Access roads would be used by on-site workers for operation and maintenance purposes. This could increase the mortality of ring-necked pheasants from vehicle collisions during Project operations.

Habitat degradation has been documented throughout the range of ring-necked pheasants in the United States, with the increase in industrial-scale farming and associated loss of fallow land (Giudice and Ratti 2020). Degradation of ring-necked pheasant habitat is largely attributed to changes in agricultural practices, increased livestock grazing, increased use of pesticides, and loss of wetlands (Giudice and Ratti 2020). The Project is not anticipated to cause further degradation of ring-neck pheasant habitat beyond the areas of permanent loss, as the agricultural practices and livestock grazing within the Lease Boundary are not anticipated to change as a result of the Project.

A mean exposure index was not calculated for ring-necked pheasants because the species' flight heights were not available from field surveys (Horse Heaven Wind Farm, LLC 2021a). Ring-necked pheasants spend most of their time on the ground, using walking as the main mode of locomotion. Ring-necked pheasants will run to seek cover from a threat rather than flush (Giudice and Ratti 2020). However, the species is the seventh most commonly reported fatality at wind facilities in Washington (Horse Heaven Wind Farm, LLC 2021a). At the adjacent Nine Canyon Wind Project, 14 percent of bird fatalities during post-construction monitoring were ring-necked pheasants (Horse Heaven Wind Farm, LLC 2021a). As ring-necked pheasant mortalities are fairly common at wind farms in the region, it is expected that the Project would result in a risk of ring-necked pheasant mortality.

The species has been introduced to the area and is stocked by the Washington Department of Fish and Wildlife (WDFW) for hunting (WDFW 2022b). As ring-necked pheasants are an introduced species, adaptable to agricultural environments and anthropogenic changes, and the populations are supported through captive breeding to facilitate hunting, local populations are expected to be resilient to Project impacts.

Construction of the Project (Turbine Options 1 and 2, solar arrays, BESSs, substations, and comprehensive Project) is predicted to have a low-magnitude impact on ring-necked pheasants that is long term and unavoidable for habitat loss and short term and probable for disturbance and mortality. Construction impacts are expected to be confined to the Project Lease Boundary. During operation of turbines (Options 1 and 2) and comprehensive Project, impacts are predicted to have a low-magnitude, long term, unavoidable impact on ring-necked pheasants within the Project Lease Boundary (confined). Operation of the solar arrays, BESSs, and substations is predicted to have a negligible, long term, unavoidable impact on ring-necked pheasants that is confined to the Project Lease Boundary. Impacts from decommissioning for all components and the comprehensive Project are predicted to be negligible, short term, feasible, and confined.

Sagebrush Sparrow

As noted in the ASC, one sagebrush sparrow (*Artemisiospiza nevadensis*) was documented in the Lease Boundary during field surveys (Horse Heaven Wind Farm, LLC 2021b). Sagebrush sparrow is considered a shrub-steppe obligate species and occurs where shrubs, primarily big sagebrush (*Artemisia tridentata*), have greater cover (WDFW 1996). Small patches of suitable nesting and foraging habitat are present in the Lease Boundary, with larger, more contiguous shrub-steppe habitat available north of the Lease Boundary (Horse Heaven Wind Farm, LLC 2021a). PHS data report one occurrence of sagebrush sparrow within 2 miles of the Lease Boundary (WDFW 2022a). Breeding territory is variable in size and shape from a mean of approximately 10.9 acres reported in Idaho to a low of approximately 1.6 acres in Nevada and Oregon (Martin and Carlson 2020). Nests are usually constructed within shrubs, predominantly sagebrush, but may be constructed on the ground or in bunchgrasses (Martin and Carlson 2020). The Project would result in the permanent loss of 2 acres of shrub-steppe, and an additional 0.3 acres within the solar arrays would become modified habitat. In addition, it is predicted that approximately 1,019 acres of shrub-steppe habitat is within the ZOI and may be impacted during operation. Permanent loss and disturbance from the Project could reduce breeding and foraging opportunities for sagebrush sparrows.

Habitat fragmentation, in general, is likely the largest indirect impact on sagebrush sparrow populations regionally. Shrub-steppe ecosystems have been impacted by livestock grazing, conversion to agricultural land, and energy and natural resource development, leaving many shrub-steppe ecosystems severely fragmented (Knick et al. 2003). As a shrub-steppe obligate species, further degradation or fragmentation of remaining habitat could impact populations. While population changes are not typically observed directly after alteration of vegetation, densities of sagebrush sparrow may decline in subsequent years (Martin and Carlson 2020).

One fatality of sagebrush sparrow has been recorded at wind farms in Washington (Horse Heaven Wind Farm, LLC 2021a). Mean exposure indices for sagebrush sparrows were not calculated because observations do not have associated flight heights (Horse Heaven Wind Farm, LLC 2021a). Sparrows account for an estimated 6.0 percent of all bird mortalities at wind turbines; however, sagebrush sparrow mortalities specifically have not been reported (Erickson et al. 2014). Foraging by sagebrush sparrows is typically done while walking or hopping on the ground. On breeding ranges, individuals engage in long or short flights when disturbed, generally over the top of shrubs (Martin and Carlson 2020). As these movement behaviors are generally low to the ground (e.g., near the top of shrubs), these behaviors limit the likelihood of interaction with turbine strike zones.

Sagebrush sparrow populations are in decline, notably in Washington (Martin and Carlson 2020). However, based on the low incidence of occurrence within the Lease Boundary, movement behaviors, and the low observed mortality rate for the species, the Project is not anticipated to substantially contribute to population decline for sagebrush sparrow.

Construction of the Project (Turbine Options 1 and 2, solar arrays, BESSs, substations, and comprehensive Project) is predicted to have a low-magnitude impact on sagebrush sparrows that is constant and unavoidable for habitat loss and short term and probable for disturbance and mortality. Construction impacts are expected to be confined to the Project Lease Boundary. During operation of the turbines (Options 1 and 2), solar arrays, and comprehensive Project, impacts are predicted to be medium magnitude, constant, unavoidable and confined to the Project Lease Boundary. Operation of the BESSs and substations is predicted to have a negligible, long term, unavoidable impact on sagebrush sparrows that is confined to the Project Lease Boundary. Impacts from decommissioning for all components and the comprehensive Project are predicted to be negligible, short term, feasible, and confined.

Sage Thrasher

Three observations of sage thrasher (*Oreoscoptes montanus*) were recorded within the Lease Boundary during field surveys in spring and fall (Horse Heaven Wind Farm, LLC 2021a). Small patches of suitable nesting and foraging habitat are present in the Lease Boundary, and larger, more contiguous shrub-steppe habitat is available north of the Lease Boundary (Horse Heaven Wind Farm, LLC 2021a). Sage thrasher is likely to occur within the Lease Boundary during the operation stage of the Project. PHS data do not report occurrences of sage thrasher within 2 miles of the Lease Boundary (WDFW 2022a). Sage thrasher is a shrub-steppe obligate species and occurs more frequently where cover is dominated by shrubs, primarily big sagebrush. Mean breeding territory size is variable and has been observed to range from approximately 2.4 acres (0.96 hectares) in Idaho to approximately 0.96 acres (0.39 hectares) in central Washington (Reynolds et al. 2020). The Project would result in the permanent loss of 2 acres of shrub-steppe, and an additional 0.3 acres would become modified habitat within solar arrays. In addition, it is predicted that 1,019 acres of shrub-steppe habitat is within the ZOI and may be impacted during operation. Permanent loss and disturbance from the Project could reduce nesting and foraging opportunities for sage thrashers.

Nests are constructed mainly in shrubs, predominantly sagebrush, but sage thrashers may construct nests on the ground under sagebrush (Reynolds et al. 2020). Habitat fragmentation, as discussed above, could impact breeding use by sage thrashers in the Lease Boundary. Habitat fragmentation is associated with increased nest predation and parasitism, resulting in reduced nest success in fragmented shrub-steppe. This may be a result of increased edge effects in fragmented landscapes (Johnson and O'Neil 2001). Increasing the linear distance of transmission lines may also increase predation on species breeding in sagebrush shrub-steppe (Knick et al. 2003).

In addition, sage thrashers are sensitive to human disturbance during the breeding season and will not approach the nest if an observer is within approximately 492 feet (150 meters approximately) (Reynolds et al. 2020). Increased human activity, including construction and maintenance workers and vehicle traffic, could cause indirect disturbance to nesting sage thrashers in the Lease Boundary.

One fatality of sage thrasher has been recorded at wind farms in Washington (Horse Heaven Wind Farm, LLC 2021a). Mean exposure indices for sage thrasher were not calculated because observations do not have associated flight heights (Horse Heaven Wind Farm, LLC 2021a). Sage thrashers commonly move by running within breeding territories and use quick, low flights as an escape response to seek cover (Reynolds et al. 2020).

Sage thrasher populations have declined an estimated 10 to 30 percent since 2003 (Hammerson and Cannings 2022). The Project is predicted to alter sage thrasher habitat, and construction and maintenance activities may disturb nesting thrashers. Sage thrashers are not expected to have frequent mortalities at the site.

Construction of the Project (Turbine Options 1 and 2, solar arrays, BESSs, substations, comprehensive) is predicted to have a low-magnitude impact on sage thrasher that is constant and unavoidable for habitat loss and short term and probable for disturbance and mortality. Construction impacts are expected to be confined to the Lease Boundary. During the operation of turbines (Options 1 and 2), solar arrays, and comprehensive Project, impacts are predicted to be medium magnitude, constant, unavoidable and confined to the Project Lease Boundary. Operation of the BESSs and substations is predicted to have a negligible, long term, unavoidable impact on sage thrasher that is confined to the Project Lease Boundary. Impacts from decommissioning for all components and the comprehensive Project are predicted to be negligible, short term, feasible, and confined.

Sandhill Crane

Observations of sandhill cranes (*Antigone canadensis*) totaled 3,050 individuals in 27 groups during field surveys for the Project. The majority of observations were during fall (Horse Heaven Wind Farm, LLC 2021a). Sandhill cranes were observed traveling over the Lease Boundary but were not recorded landing or using habitat in the Lease Boundary (Horse Heaven Wind Farm, LLC 2021a). Sandhill cranes observed flying over the Lease Boundary were migratory individuals, and suitable stopover habitat, which includes agricultural land interspersed with wetlands, is largely absent from the Lease Boundary (Horse Heaven Wind Farm, LLC 2021a). However, transient individuals may forage in agricultural land within the Lease Boundary. Permanent disturbance from the Project would result in the direct loss of 489 acres of agricultural land.

Sandhill cranes have the highest mean use of the special status bird species observed during field surveys for the Project. The exposure index for sandhill cranes under Option 1 is approximately eight times less than under Option 2 (GAL 2022 [**Appendix 4.6-1**]; Horse Heaven Wind Farm, LLC 2021a). Few post-construction studies have documented mortalities of sandhill crane at wind farm facilities; one was documented in the Altamont Pass Wind Resource Area in California, and two at wind facilities in west Texas (Horse Heaven Wind Farm, LLC 2021a). No fatalities of sandhill crane have been documented at the adjacent Nine Canyon Wind Farm (Horse Heaven Wind Farm, LLC 2021a). Sandhill cranes may not be particularly susceptible to risk of collision with turbines. Studies at wind facilities in other parts of the United States have shown that sandhill cranes are likely to avoid turbines despite relatively high numbers being observed within and surrounding wind facilities (Nagy et al. 2012; Pearse et al. 2016).

The Central Valley sandhill crane population, which is predominantly composed of greater sandhill crane (*A. c. tabida*), appears to be increasing (WDFW 2022b). Systematic surveys and population trend analysis is not available for the Pacific flyway population, which is predominantly composed of least (*A.c. anadensis*) and Canadian (*A. c. rowani*) (Gerber et al. 2020) sandhill cranes. The Project does not provide unique habitat, and although sandhill cranes were documented flying over the Lease Boundary, the species may be able to avoid turbines. Therefore, it is expected that sandhill cranes may be resilient to Project impacts.

Construction of the Project (Turbine Options 1 and 2, solar arrays, BESSs, substations, and comprehensive Project) is predicted to have a negligible impact on sandhill cranes that is long term and unavoidable for habitat loss and short term and feasible for disturbance and mortality. Construction impacts are expected to be confined to the Project Lease Boundary. During the operation of turbines (Options 1 and 2) and comprehensive Project, impacts are predicted to have a medium-magnitude, long term impact on sandhill cranes that may feasibly occur within the Project Lease Boundary (confined). Operation of the solar arrays, BESSs, and substations is predicted to have a negligible, long term impact on sandhill cranes that is unavoidable and confined the Project Lease Boundary. Impacts from decommissioning for all components and the comprehensive Project are predicted to be negligible, short term, feasible, and confined.

Tundra Swan

Tundra swans (*Cygnum columbianus*) were documented in the Lease Boundary during surveys completed for the Project (Horse Heaven Wind Farm, LLC 2021a). Suitable habitat for tundra swans within the Lease Boundary includes agricultural land, where they may forage on available grain following harvest. Permanent disturbance of approximately 489 acres of agricultural land would occur from Project construction (Horse Heaven Wind Farm, LLC 2021a).

In addition, Project operations could cause indirect impacts on tundra swans. Avoidance of suitable habitat in proximity to wind turbines may alter tundra swans’ use of the Lease Boundary. A review of the response of swans and geese to wind turbines found displacement distances of approximately 656 to 1,837 feet (200 to 560 meters) for swans at onshore facilities, and 98 to 1,969 feet (30 to 600 meters) for geese (Rees 2012). Approximately 39,169 acres of agricultural land may be disturbed by the Project.

Exposure indices for tundra swans are 0.011 for Option 1 and zero at all other turbine technologies. Because Option 1 would also require a greater number of turbines than Option 2, it is expected to result in greater collision risk for tundra swans. No fatalities of tundra swans have been documented at wind facilities in Washington (Horse Heaven Wind Farm, LLC 2021a). Swans and geese may exhibit avoidance of wind turbines, given the high number of observations at wind facilities and low incidence of collision mortality (Rees 2012). Avoidance behavior can result in increased energetic costs for migrating swans, which can vary depending on the proximity of the disturbance to breeding and foraging areas (Rees 2012).

Mortality of water-associated birds, such as tundra swans, may occur if birds attempt to land on solar arrays. Tundra swans flying over the Lease Boundary could perceive solar arrays as waterbodies (lake effect).

Tundra swan populations throughout North America are predicted to be increasing; however, the western populations are estimated to be declining approximately 2.3 percent per year (Limpert et al. 2020). The Project may reduce the amount of foraging habitat for tundra swans; however, it is expected that tundra swans may avoid the Lease Boundary during Project operation. As such, tundra swans are expected to be moderately resilient to Project-related impacts.

Construction of the Project (Turbine Options 1 and 2, solar arrays, BESSs, substations, and comprehensive Project) is predicted to have a low-magnitude impact on tundra swans that is long term and unavoidable for habitat loss and short term and feasible for disturbance and mortality. Construction impacts are expected to be confined to the Project Lease Boundary. During operation under Turbine Option 1 and the comprehensive Project, impacts are predicted to be low magnitude, long term and may feasibly occur within the Project Lease Boundary (confined). Operation under Turbine Option 2 is predicted to have a negligible impact on tundra swans that is long term, unavoidable, and confined to the Project Lease Boundary. Operation of the solar arrays is predicted to have a low-magnitude, long term impact on tundra swans that may feasibly occur within the Project Lease Boundary (confined). Operation of the BESSs and substations is predicted to have a negligible, long term, unavoidable impact that is limited in extent. Impacts from decommissioning for all components and the comprehensive Project are predicted to be negligible, short term, feasible, and confined.

Vaux's Swift

Vaux's swifts (*Chaetura vauxi)* were not documented during field surveys conducted by the Applicant within the Lease Boundary (Horse Heaven Wind Farm, LLC 2021a). Suitable breeding habitat for this species includes coniferous or mixed forest, with a preference for old-growth forest (Schwitters et al. 2021). Vaux's swifts roost in nest trees during the breeding season and often use chimneys for roosting during migration (Schwitters et al. 2021). Suitable nesting and roosting habitat does not occur within the Lease Boundary, though Vaux's swifts may migrate over the Lease Boundary. The Project is not anticipated to directly or indirectly impact habitat for Vaux's swifts, though Project operation could disturb migrating Vaux's swifts.

Five fatalities of Vaux's swift have been documented at wind facilities in the United States (AWWI 2020). Flocking birds, such as Vaux's swifts, may be more susceptible to strikes during migration (Roman et al. 2020). The Project is not anticipated to cause mortality of Vaux's swifts, given their low occurrence in the Lease Boundary, lack of suitable nesting and roosting habitat, and low incidence of collisions at other wind farm facilities.

Construction of the Project construction (Turbine Options 1 and 2, solar arrays, BESSs, substations, and comprehensive Project) is predicted to have a negligible impact on Vaux's swift that is short term and unlikely to occur within the Project Lease Boundary (confined). During the operation of the turbines (Options 1 and 2) and the comprehensive Project, impacts are predicted to be low magnitude and long term and may feasibly occur within the Project Lease Boundary (confined). Operation of the solar arrays, BESSs, and substations is predicted to have a negligible, long term impact on Vaux's swifts that is unlikely to occur within the Project Lease Boundary (confined). Impacts from decommissioning for all components and the comprehensive Project are predicted to be negligible, short term, unlikely, and confined.

Black-tailed Jackrabbit and White-tailed Jackrabbit

The Lease Boundary has been mapped as suitable habitat for black-tailed jackrabbits (*Lepus californicus*) based on predictive mapping provided by the Applicant, while suitable white-tailed jackrabbit (*Lepus townsendii*) habitat is generally patchy across the Lease Boundary (Horse Heaven Wind Farm, LLC 2021d). The Applicant notes that these species are rare in the Lease Boundary (Horse Heaven Wind Farm, LLC 2021a). PHS data report five occurrences of black-tailed jackrabbit within 2 miles of the Lease Boundary (WDFW 2022a). Although the species are regionally rare, the Lease Boundary provides suitable habitat, and the Project is predicted to result in the direct loss of approximately 102 acres of shrub and grassland habitat that could support these species. The Project is predicted to result in the temporary loss of 601 acres of suitable habitat and modification of 1,019 acres of potentially suitable habitat. The response of small mammals to wind turbines is not well studied (Arnett et al. 2007), although, in their assessment of response to wind facilities in an agricultural setting, Lopucki et al. (2017)

noted that European hares (*Lepus europaeus*) appeared to avoid turbines and the surrounding 0.44 miles (700 meters). WHCWG (2012) notes that wind power projects generally result in limited direct habitat loss; however, associated road and transmission line infrastructure can alter the suitability of habitat. The ZOI applied for the Project is expected to include indirect black-tailed and white-tailed jackrabbit habitat loss. Therefore, approximately 13,260 acres of suitable habitat (grassland and shrub) may be indirectly lost or disturbed due to Project operation.

Solar arrays may provide novel shelter for jackrabbits that reduces predation by aerial predators (e.g., raptors). Vegetation would be maintained under the solar arrays, which may attract jackrabbits, depending on ground conditions.

Sources of potential black-tailed and white-tailed jackrabbit mortalities are expected to include interaction with construction equipment and road-based mortalities during operation. Jackrabbits are vulnerable to road mortality (WHCWG 2012), although the risk of mortality is linked to traffic volumes and speeds. Limited Project-related traffic is predicted during the operation stage of the Project, reducing potential risk of mortality for jackrabbits. In addition, transmission poles can increase the availability of perch sites for raptors, increasing predation pressure on jackrabbits (WHCWG 2012).

New access roads that create linear disturbances across the landscape would potentially fragment remaining jackrabbit habitat, particularly where roads bisect shrub and grassland habitats. Roads are listed as a major connectivity threat to jackrabbits by creating barriers to limit access to shrub and grassland habitats (WHCWG 2012).

Construction of the Project (Turbine Options 1 and 2, solar arrays, BESSs, substations, and comprehensive Project) is predicted to have a low-magnitude impact on black-tailed and white-tailed jackrabbits that is constant and unavoidable for habitat loss and short term and probable for disturbance and mortality. Construction impacts are expected to be confined to the Project Lease Boundary. During the operation of the turbines (Options 1 and 2) and the comprehensive Project, impacts are predicted to be medium magnitude, constant, and unavoidable within the Project Lease Boundary (confined). Operation of the solar arrays is predicted to have a low-magnitude, constant impact that is feasible within the Project Lease Boundary. Operation of the BESSs and substations is predicted to have a negligible, long term, and unavoidable impact that is limited in extent. Impacts from decommissioning for all components and the comprehensive Project are predicted to be negligible, short term, feasible, and confined.

Townsend's Big-eared Bat

Townsend's big-eared bats (*Coryhorhinus townsendii*) were not recorded during bat acoustic surveys conducted by the Applicant for the Project (Horse Heaven Wind Farm, LLC 2021a). Suitable habitat for this species is minimal within the Lease Boundary due to the absence of roosting and hibernacula sites (Horse Heaven Wind Farm, LLC 2021a). Townsend's big-eared bats may travel up to approximately 6.5 miles (10.5 kilometers) from roost sites to forage (Gruver and Keinath 2006). Foraging occurs in a variety of habitat, including riparian areas, forests and edge habitats, woodlands, and sagebrush shrub-steppe; however, foraging areas may be selected based on proximity to available roosting sites (Gruver and Keinath 2006). Suitable foraging habitat could exist over the Lease Boundary in shrubland, but it is uncertain whether roosting sites exist in the surrounding landscape. Townsend's big-eared bats have not been documented in the southern Columbia Basin (WDFW 2022b).

Bat fatality studies at the adjacent Nine Canyon Wind Farm documented 27 bat fatalities of the silver-haired bat (*Lasionycteris noctivagans*) and hoary bat (*Lasiurus cinereus*) species (Erickson et al. 2003). Bat fatalities were estimated to be approximately 3.21 bats per turbine per year (Erickson et al. 2003). Limited information on fatalities of Townsend's big-eared bats at wind facilities is available. As suitable roosting habitat does not occur in the Lease Boundary, and since the species was not detected during the surveys, Project operation is anticipated to have limited impact on Townsend's big-eared bat mortality.

Construction of the Project (Turbine Options 1 and 2, solar arrays, BESSs, substations, and comprehensive Project) is predicted to have a negligible impact on Townsend's big-eared bat that is short term, feasible, and confined to the Project Lease Boundary. During operation of the turbines (Options 1 and 2) and the comprehensive Project, impacts are predicted to be low magnitude, long term, and probable within the Project Lease Boundary (confined). Operation of the solar arrays is predicted to have a low-magnitude, long term impact that is unlikely to occur within the Project Lease Boundary. Operation of the BESSs and substations is predicted to have a negligible, long term, and unlikely impact that is limited in extent. Impacts from decommissioning for all components and the comprehensive Project are predicted to be negligible, short term, unlikely, and confined.

Townsend's Ground Squirrel

The Lease Boundary overlaps Townsend's ground squirrel (*Urocitellus townsendii*) habitat concentration areas, as well as mapped predicted core Townsend's ground squirrel habitat (NatureMapping n.d.). Grassland and shrub-steppe habitats within the Lease Boundary are expected to provide suitable habitat, while other habitats, such as agricultural fields and roadsides, could provide marginal habitat. PHS data report nine occurrences of Townsend's ground squirrels within 2 miles of the Lease Boundary (WDFW 2022a). The Applicant predicts that the Project would result in the loss of approximately 1,554 acres of suitable Townsend's ground squirrel habitat. It is estimated that the Project may result in a loss of approximately 102 acres of grassland and shrub-steppe habitat that could provide potentially suitable Townsend's ground squirrel habitat, as well as temporary loss and modification of 601 acres and 1,019 acres, respectively, of potentially suitable habitat. The Project would also impact one of the two Townsend's ground squirrel colonies in the Lease Boundary, which is located within the temporary disturbance footprint. This would result in a loss of denning habitat for the species.

There is limited information on the response of small mammals, including Townsend's ground squirrel, to wind power projects. California ground squirrels (*Spermophilus beecheyi*) near the Altamont Pass Wind Resource Area are reported to show greater levels of predator vigilance and returned to burrows more frequently when located closer to turbines (Rabin and Cross 2006). Lopucki et al. (2018) reported that common voles display a physiological response (increased corticosterone concentrations, indicating stress response) in individuals living closer to turbines, although they also reported that a similar response was not observed in striped field mice. Lopucki et al. (2018) postulate that striped field mice have more behavioral plasticity and commonly live near humans, suggesting that some species may be adaptable to wind power disturbances. It is unknown whether disturbance from wind turbines would result in long term effects on local Townsend's ground squirrel populations, although observations from the Stateline Wind Farm suggest that ground squirrel populations have remained stable post-construction (WHCWG 2012). It is expected that the ZOI developed for the Project is sufficiently conservative to capture Townsend's ground squirrel habitat that may be indirectly impacted by the Project.

Solar arrays may provide novel shelter for Townsend's ground squirrels that reduces predation by aerial predators (e.g., raptors). Vegetation would be maintained under solar arrays, which could attract Townsend's ground squirrels to these locations, depending on ground conditions.

Potential sources of Project-related ground squirrel mortalities include collisions with construction equipment, fatalities during ground-disturbing activities near colonies, and road-based mortalities during construction and operation. Risk of mortalities is expected to increase during construction activities near colonies. The Applicant reports that two known colonies of Townsend's ground squirrels occur within the Lease Boundary, one of which would be directly disturbed by the Project. Risk of Townsend's ground squirrel mortalities is expected to be highest during work near active colonies. While two colonies are known to occur within the Lease Boundary, species-specific surveys were not conducted; therefore, there is potential for additional colonies to be present. Townsend's ground squirrels may also live near roads bordered by natural vegetation and are vulnerable to mortality during road crossings. The Project is expected to generate low traffic volumes during the operation stage, which would be a limited risk to ground squirrels. New transmission poles would increase available raptor perching habitat, potentially increasing predation pressures near these features. The Project is not expected to require the use of rodenticides or pesticides that could be consumed by ground squirrels.

New access roads, particularly in grassland, shrub land, and more complex agricultural fields, may further fragment Townsend's ground squirrel habitat. Ground squirrels have been observed crossing smaller roads (WHCWG 2012); therefore, it is expected that minor access roads constructed for Project use would not create substantial barriers to movement.

Townsend's ground squirrel population and population trends in Washington State are unknown (WDFW 2022b), though Hammerson and Canning (2022) estimate that the population may have declined more than 70 percent as the species is absent from much of its former range, with 10 percent of natural habitat remaining within the historical range. As the species is able to persist in some built infrastructure areas, it is expected that the population has moderate resilience to disturbance, but may have low resiliency to loss or damage of remaining colonies.

Construction of the Project (Turbine Options 1 and 2, solar arrays, BESSs, and substations) is predicted to have a medium impact on Townsend's ground squirrels that is constant and unavoidable for habitat loss and short term and probable for disturbance and mortality. Construction impacts are expected to be confined to the Project Lease Boundary. During operation of the turbines (Options 1 and 2), solar arrays, and comprehensive Project, impacts are predicted to be medium magnitude, constant, and feasible within the Project Lease Boundary (confined). Operation of the BESSs and substations is predicted to have a negligible, constant, and feasible impact that is limited in extent. Impacts from decommissioning for all components and the comprehensive Project are predicted to be negligible, short term, feasible, and confined.

Pronghorn Antelope

Pronghorn antelopes have been re-introduced to Washington State by the Yakama Nation. While not a special status species, it is understood that the species is important for the Yakama Nation. Pronghorn antelopes were re-introduced onto the Yakama Reservation, located west of the Lease Boundary, but have since moved into adjacent areas (Fidorra et al. 2019). Winter surveys documented pronghorn antelope occurrence in the western portion of the Lease Boundary (Tetra Tech 2021). Fidorra and Peterson (2021) report groups of pronghorn antelope varying in size (1 to 24 individuals) in the western, central, and eastern parts of the Lease Boundary. The Project is predicted to result in the loss of approximately 51 acres of shrub, 51 acres of grassland, and 489 acres of agricultural land that could be used by pronghorn antelopes. Fencing around solar arrays is expected to prevent pronghorn antelopes from accessing the structures.

Research on pronghorn antelopes' response to wind power projects reports variable results. Smith et al. (2020) found that female pronghorns avoided wind turbines in their winter range, whereas the Applicant notes that other studies have reported inconsistent responses by pronghorn antelopes to wind power projects (Tetra Tech 2021). Landon et al. (2000) reported that pronghorn antelopes generally preferred areas with lower noise levels (<45 decibels). Based on the available information, it is reasonable to expect pronghorn antelopes to avoid Project construction activities and, potentially, operational activities (Tetra Tech 2021). It is expected that the ZOI selected for the Project (0.5 miles) would sufficiently encompass habitat indirectly lost as a result of Project-related disturbance.

The Applicant reports road-related mortalities and entanglement with barbed wire fence as potential sources of direct pronghorn antelope mortality. Increased road density due to the Project would increase the risk of road-related mortality, though Project-related traffic is predicted to be low. Fencing around solar arrays would include a 6-foot-high security fence, without use of barbed wire (Horse Heaven Wind Farm, LLC 2021a). As such, Project-related fencing is not expected to pose a potential risk of pronghorn antelopes' mortality. Alteration in access to, or disturbance of, suitable wintering and foraging habitat could lead to reduced pronghorn antelope survivorship or fecundity. There is insufficient information on habitat use by the re-introduced herd within the Lease Boundary to understand if the required extent of seasonal pronghorn habitat is provided by available habitat within the Lease Boundary.

Collar data provided by WDFW suggest that pronghorn antelope could move along the top of the Horse Heaven Hills ridge and through canyons and draws. If pronghorn antelopes avoid the Project during the operation stage, the Project could create a barrier to west-east movement. However, there is insufficient information on the movement patterns of the re-introduced herd to understand how, or if, the Project may influence movement.

Construction of the Project (Turbine Options 1 and 2, solar arrays, BESSs, substations, and comprehensive Project) is predicted to have a medium-magnitude impact in pronghorn antelope that is constant and unavoidable for habitat loss and short term and probable for disturbance. Construction impacts are expected to be confined to the Project Lease Boundary. During the operation of the turbines (Options 1 and 2) and the comprehensive Project, impacts are predicted to be medium magnitude, constant, and unavoidable within the Project Lease Boundary (confined). Operation of the solar arrays is predicted to result in medium magnitude, constant, unavoidable impacts within the Project Lease Boundary (confined), while operation of the BESSs and substations is predicted to have a negligible, long term, and unavoidable impact that is limited in extent. Impacts from decommissioning for all components and the comprehensive Project are predicted to be negligible, short term, feasible, and confined.

4.6.2.5 Applicant Commitments and Identified Mitigation

This section describes the measures that would reduce or compensate for impacts related to wildlife and habitat from construction, operation, and decommissioning of the Project. These measures would be implemented in addition to compliance with the environmental permits, plans, and authorizations required for the Project.

Applicant Commitments

The Applicant has identified measures and/or best practices that are designed to prevent or minimize potential impacts on the affected environment for the Project. Measures presented by the Applicant in the ASC and taken into consideration in the characterization of potential impacts on wildlife and habitat are discussed in Section 2.3 and summarized below (Horse Heaven Wind Farm, LLC 2021a). The Applicant has drafted a Habitat Mitigation Plan (Appendix L of the ASC) for the wind energy generation areas of the Project, consistent with the WDFW

Wind Power Guidelines, where applicable (WDFW 2009). The Habitat Mitigation Plan separately addresses mitigation for the solar and battery storage facility elements, consistent with best available industry practices.

- To minimize impacts on wildlife, baseline studies were conducted at the Project consistent with the WDFW Wind Power Guidelines (WDFW 2009), the U.S. Fish and Wildlife Service's (USFWS) 2012 Final Land-Based Wind Energy Guidelines (USFWS 2012), the 2013 USFWS Eagle Conservation Plan Guidance Module 1 – Land Based Wind Energy (USFWS 2013), and the USFWS 2016 Eagle Rule Revision (USFWS 2016). To mitigate and avoid wildlife resources, the Applicant used the results of these baseline studies to inform the Project's layout design.
- Project facilities would be sited on previously disturbed areas (e.g., cultivated cropland) to the extent feasible to avoid impacts on native habitats and associated wildlife species.
- The Project would use industry standard best management practices to minimize impacts on vegetation, water, and wildlife.
- The Project would be sited outside of wetlands and waters to the extent feasible to avoid and minimize impacts on these resources, which would also avoid impacts on fish and minimize impacts on wildlife species that use these habitats.
- If the final design results in impacts on waters of the state that cannot be avoided, the Applicant would work with the Washington Energy Facility Site Evaluation Council (EFSEC) and WDFW to determine whether a Hydraulic Project Approval is required and would prepare an application accordingly.
- During construction, WDFW-recommended seasonal buffers (per Larsen et al. 2004) for ferruginous hawk nests would be observed to avoid disturbing nesting ferruginous hawks.
- During construction, WDFW-recommended seasonal buffers (per Larsen et al. 2004) for burrowing owl nests would be observed to avoid disturbing nesting burrowing owls, if present. If impacts on potentially suitable habitat cannot be avoided during final design, the Applicant would consult with WDFW regarding the need for burrowing owl surveys prior to construction, including surveys to determine habitat suitability for burrowing owls, and surveys for breeding owls if suitable habitat is present.
- The Applicant would minimize bird and bat collisions with Project infrastructure by implementing down-shield lighting (e.g. for permanent lighting at the substations and O&M facilities) that would be sited, limited in intensity, and hooded in a manner that prevents the lighting from projecting onto any adjacent properties, roadways, and waterways; lighting would be motion activated where practical (i.e. excluding security lighting).
- All permanent met towers would be un-guyed to minimize collision risk for wildlife.
- The Applicant would acquire any required federal approvals as described in Section 2.23 of the ASC. The Applicant would continue ongoing coordination with the USFWS (Mathew Stuber, Eagle Coordinator, Columbia Pacific Northwest Region) regarding an eagle take permit for incidental take of bald and golden eagles and would continue to evaluate eagle risk to determine if an eagle take permit is appropriate considering the use of the Project area by bald and golden eagles. The Applicant does not plan to pursue an eagle take permit but would re-evaluate eagle risk and the need for an eagle take permit throughout the life of the Project.

- Following construction, temporarily disturbed areas would be revegetated with native or non-invasive, non-persistent non-native plant species as described in the Revegetation and Noxious Weed Management Plan (Appendix N of the ASC).
- The Applicant does not anticipate using pesticides during Project construction or operation; if unforeseen circumstances arise that require the use of pesticides, the Applicant would consult with WDFW and EFSEC regarding use of pesticides to avoid and minimize impacts on burrowing owl (per Larsen et al. 2004).
- The Applicant would limit construction disturbance by flagging any sensitive areas (e.g., wetlands, rare plant populations) and would conduct ongoing environmental monitoring during construction to ensure flagged areas are avoided.
- The Applicant has prepared a Bird and Bat Conservation Strategy that describes the surveys conducted, avoidance and minimization, and potential impacts on birds and bats and their habitat as a result of construction and operation of the Project (Appendix M of the ASC).
- The Applicant would conduct two years of standardized post-construction fatality monitoring to assess impacts of turbine operation on birds and bats. Proposed post-construction fatality monitoring is described in the Applicant's Bird and Bat Conservation Strategy (Appendix M of the ASC).

Pre-construction Site Selection and Project Design

Turbine Siting

- The Project would be sited outside of areas designated for environmental resource conservation, such as Areas of Critical Environmental Concern, Important Bird Areas, National Wildlife Refuges, Wilderness Areas, important migratory pathways or stopover sites, or other specially designated areas.
- All wetlands, conservation easements, protected lands, and USFWS-designated critical habitat would be avoided.
- Turbines and associated facilities for the Project would be sited with consideration for the topographic and environmental characteristics of the site, efficiency of selected turbine models, and minimal impacts on area residents.

Turbine Design

- Several alternative turbine locations were developed to provide an opportunity to avoid or minimize potential impacts on natural resources and to work around potential issues that can arise during development of the Project.
- To the extent commercially reasonable, the Applicant would maximize power generation per turbine to reduce the number of turbines needed to achieve maximum energy production.

Lighting

- Unnecessary lighting would be turned off at night to limit attraction of migratory birds. Lighting guidelines, where applicable, from the USFWS Land-Based Wind Energy Guidelines (WEG) (USFWS 2012) would be followed. This includes using lights with timed shutoff, downward-directed lighting to minimize horizontal or skyward illumination, and avoidance of steady-burning, high-intensity lights. All internal turbine nacelle and tower lighting would be extinguished when unoccupied by maintenance staff.

- The turbines and met towers would be lit in accordance with FAA requirements (FAA 2020).

Collector and Transmission Lines

- The up-to-19-mile transmission line would be located in areas where the Applicant has site control and, to the extent possible, in areas where previous disturbance has occurred, thereby minimizing impacts on habitat and associated wildlife.
- Where applicable, the Project's aboveground power lines and collection systems would be designed and constructed to minimize avian electrocution, referencing guidelines outlined in Avian Power Line Interaction Committee standards (APLIC 2006, 2012). Overhead lines may be constructed in select locations to span intermittent streams, if applicable based on the final Project design.
- The underground communication cables and power collection system would be buried along the access roads in trenches extending from each of the turbines to the Project's substation where practicable; lines would be buried along both private and public rights-of-way.

Solar Facilities

- Solar array fence lines would be designed to minimize enclosed areas within the Solar Siting Area rather than enclosing each entire Solare Siting Area. Fencing would be designed to be at least 4 inches above the ground and would not have razor wire at the top.

Construction

Compliance and Reporting

- The Applicant would comply with all applicable federal, state, and local environmental laws, orders, and regulations.
- Prior to construction, all supervisory construction personnel would be instructed on the Bird and Bat Conservation Strategy and wildlife resource protection measures, including: 1) applicable federal and state laws (e.g., those that prohibit animal collection or removal); and 2) the importance of these resources and the purpose and necessity of protecting the resources, and ensuring this information is disseminated to applicable contractor personnel, including the correct reporting procedures.
- Construction personnel would be trained in the following areas when appropriate: awareness of sensitive bird species, potential bird nesting areas, potential bat roosting/breeding habitat, and general wildlife issues.
- Personnel would be instructed to use the Applicant's incidental reporting process to document bird or bat casualties during construction of the Project.

Roads

- Traffic would be restricted to roads associated with the Project; use of unimproved roads would be minimized to the extent possible. Following Project construction, temporary access roads made for component delivery and not needed for site operations would be restored to native vegetation.
- Speed limits would be set to ensure safe and efficient traffic flow; signs would be placed along roads, as necessary, to identify speed limits, travel restrictions, and other standard traffic control information.

Stormwater and Erosion

- A Storm Water Pollution Prevention Plan (SWPPP) would be prepared and implemented, as required by the U.S. Environmental Protection Agency and the Washington Department of Ecology; the SWPPP would include standard sediment control devices (e.g., silt fences, straw bales, netting, soil stabilizers, check dams) to minimize soil erosion during and after construction.
- Stormwater management practices would be implemented to minimize open-water resources that can attract birds and bats.
- A Temporary Erosion and Sediment Control Plan would be implemented for revegetation, soil stabilization, and erosion reduction measures to ensure that temporary use areas are restored when no longer needed.

Wildlife and Vegetation

- The existing road network would be used to reduce the need for road construction, as well as minimizing disturbance to Priority shrub-steppe habitat as defined by WDFW (2009). The Applicant would avoid siting Project components in wetlands and waterbodies.
- Per WDFW recommendations, wind turbine buffer zones would be established around known raptor nests (0.25-mile buffers) if site evaluations show that proposed construction activities would pose a risk of nest abandonment or failure to avian species of concern.
- All permanent met towers would be un-guyed to minimize collision risk for wildlife.
- During construction, existing trees, vegetation, water resources, and wildlife habitat would be protected and preserved to the extent practical.
- Noxious weed control measures would be implemented as specified by county, state, and federal requirements.
- All herbicide and pesticide mixing and applications would be conducted in accordance with all federal, state, and local laws and regulations and the specific product’s label; herbicides and pesticides would only be directly applied to localized spots and would not be applied by broadcasting techniques.
- Gravel would be placed at least 5 feet around each turbine foundation to discourage small mammals and reptiles from burrowing under or near Turbine bases.
- All trash would be covered in containers, and work sites would be cleared regularly of any garbage and debris related to food.
- Personnel’s pets would not be allowed at the Project.
- To the extent feasible, the area required for Project construction and operation would be minimized. The Applicant would develop a restoration plan for restoring all areas of temporary disturbance to previous conditions, including the use of native species when seeding or planting during restoration. The restoration plan would ensure that:
  - All areas disturbed temporarily by Project construction would be restored, including temporary disturbance areas around structure construction sites, laydown/ staging areas, and temporary access roads.

- Topsoil salvage would be included in all grading activities.
- Habitat restoration activities would be performed in accordance with obligations in the wind leases.

Operation and Maintenance

Operational Procedures

- The Applicant would conduct two years of standardized post-construction fatality monitoring to assess impacts of turbine operation on birds and bats. Proposed post-construction fatality monitoring is described in the Applicant's Bird and Bat Conservation Strategy (Appendix M of the ASC).
- All carrion (with the exception of birds and bats) discovered on site during regular maintenance activities would be removed and disposed of in an appropriate manner to avoid attracting eagles and other raptors; birds and bats discovered on site would be addressed in conformance with the Project's incidental reporting process and the post-construction fatality monitoring protocols.
- Appropriate stormwater management practices that do not create attractions for birds and bats would be implemented.
- Fire hazards from vehicles and human activities would be reduced (e.g., use of spark arrestors on power equipment, avoiding driving vehicles off roads, and allowing smoking in designated areas only).
- Vehicle speeds would be limited to 25 miles per hour to avoid wildlife collisions.
- Noxious weed control measures would be implemented, as specified by county, state, and federal requirements.
- Other than maintenance vehicles, which would park at the entrance of turbines for maintenance purposes, parts and equipment that can be used as cover for prey would not be stored at the base of turbines while turbines are operating.

Training

- All of the Applicant's employees and contractors working on site would receive worker awareness training for identifying and responding to encounters with sensitive biological resources, including avian and bat species. The training would:
  - Be conducted by the Applicant or the Applicant's designee
  - Instruct employees, contractors, and site visitors to avoid harassment and disturbance of wildlife, especially during reproductive (e.g., courtship and nesting) seasons
  - Include instruction on identification and protection of plant and wildlife species and significant natural plant community habitats, microtrash and its effects, fire protection measures, and measures to minimize the spread of weeds during operation, as well as hazardous material spill and containment measures
  - Include a flyer in the O&M building and/or construction trailer(s) detailing information on potential state and federal special status animal and plant species that could be discovered on the Project site
  - Include a Wildlife Incident Reporting and Handling System that describes the steps O&M staff would take in the event of a wildlife fatality

- Include an overview of the distribution, general behavior, and ecology of golden and bald eagles. Employees would be informed that they are not authorized to approach, handle, or otherwise move any eagles, parts of eagles (i.e. feathers), eggs, or nests during construction or operation, regardless of whether the eagles are alive, injured, or deceased. In the event of an eagle fatality, a structured reporting system would be followed to notify the Applicant's project managers and follow the appropriate notification protocols to report the fatality to the USFWS within 24 hours of positive identification of the fatality as an eagle

Adaptive Management

The Applicant would incorporate an adaptive approach for the conservation of wildlife potentially impacted by the Project in coordination with the Technical Advisory Committee (TAC) prior to Project operation.

Recommended Mitigation Measures

EFSEC has identified the following additional and modified mitigation measures for the Project to avoid and/or minimize potential impacts on Wildlife.

Wild-1[19]: Upon completion of the two-year bird and bat post-construction fatality monitoring program, the Applicant would review the results with EFSEC and WDFW and determine whether additional monitoring and mitigation measures are necessary. The mitigation measure allows for continued monitoring and adaptive management of potential Project related wildlife mortalities.

Wild-2: All trash containers would be wildlife proof. The mitigation measure reduces potential human-wildlife conflicts thereby reducing potential Project related wildlife mortalities.

Wild-3: The Applicant would provide EFSEC a summary of the consultation undertaken with the USFWS regarding eagle mortality. The mitigation measure allows for continued monitoring and adaptive management of potential Project related impacts to eagles.

Wild-4: The Applicant would avoid the use of pesticides, including rodenticides, during Project construction and operation. If the use of pesticides is required, the Applicant would develop a management plan for submission to and approval by EFSEC that describes how the Applicant would avoid and/or otherwise minimize potential impacts on wildlife, including all potentially impacted special status species. The mitigation measure reduces potential impacts on habitat and wildlife mortality while allowing for adaptive management of potential Project related impacts.

Wild-5: The Applicant would limit construction disturbance by identifying sensitive areas on mapping and flagging any sensitive areas including wildlife features, such as wildlife colonies, active nests, dens, and wetlands in the field. The Applicant would conduct ongoing environmental monitoring during construction to ensure that flagged areas are avoided. The mitigation measure reduces potential loss of habitat and wildlife mortality.

Wild-6: The Applicant would maintain a database of road mortalities through construction and operation as part of the operational procedures. The Applicant would review road-based mortalities annually and propose additional mitigation for areas, under the control of the Applicant, with frequent mortalities or wildlife crossing observations. Additional mitigation measures may include speed control, signage, temporary

[19] Wild-: Identifier of numbered mitigation item for Wildlife

road closures (e.g., during migration periods), or wildlife passageways. The mitigation measure allows for continued monitoring and adaptive management of potential Project related wildlife mortalities.

Wild-7: The Applicant would schedule construction activities to occur during daylight hours, when feasible, to reduce disturbance of nocturnal species and the need for nighttime lighting. The mitigation measurereduces disturbance to wildlife (i.e., indirect loss).

Wild-8: Wind turbine buffer zones would be established around all known raptor nests and be a minimum of 0.25 miles. The Applicant would prepare a Raptor Nest Monitoring and Management Plan for review by EFSEC and the TAC if buffer zones cannot be maintained. The mitigation measure reduces potential impacts on habitat and raptor mortality while allowing allow for adaptive management of potential Project related impacts.

Wild-9: Vegetation clearing and grubbing would avoid local bird breeding periods, when feasible, to reduce potential destruction or disturbance of nesting birds. If avoidance of this period is not feasible, additional mitigation measures, such as pre-construction surveys for and buffering of active bird nests, would be undertaken. The mitigation measure avoids or reduces potential bird mortality.

Hab[20]-1: The Applicant would locate Project components, including roads and powerlines, outside of modelled movement corridors to the extent feasible. Rationale would be provided to EFSEC for siting components within movement corridors, and a Corridor Mitigation Plan would be required that describes:

- Extent of direct and indirect habitat impact within the movement corridor
- Proposed measures to be implemented to reduce potential impacts on movement corridors (e.g., habitat enhancements to promote continued use of corridors)
- Proposed features to accommodate wildlife movement for linear Project components (e.g., roads, powerlines)
- Proposed restoration in movement corridors following Project decommissioning

The mitigation measure reduces potential Project related barriers to wildlife movement while allowing for continued monitoring and adaptive management of potential Project related barriers.

Hab-2: Transmission line crossings of canyons and draws would be minimized. Where crossings are required, the Applicant would provide EFSEC with rationale for the crossings and propose additional mitigation measures to reduce potential barriers to movement and wildlife collisions. The mitigation measure reduces potential Project related barriers to wildlife movement while allowing for continued monitoring and adaptive management of potential Project related barriers.

Hab-3: Temporary laydown areas. Temporary laydown areas would be situated out of native shrub-steppe habitat. Where temporary disturbance of shrub-steppe habitat is required, the Applicant would provide EFSEC with rationale and propose additional mitigation measures to reduce habitat loss. The mitigation measure avoids and reduces impacts to habitat while allowing for adaptive management of potential Project related habitat loss.

[20] Hab-: Identifier of numbered mitigation item for Habitat

Hab-4: The Applicant, in consultation with EFSEC, would establish a TAC. The TAC would be established at least one year prior to construction and would be responsible for reviewing and providing technical advice on documents produced by the Applicant related to wildlife and wildlife habitat. The TAC would also provide direction on adaptive management. The TAC would be responsible for, at a minimum:

- Providing input to, and review of, Project wildlife and habitat management plans (e.g., ferruginous hawk management plan),
- Review and provide advice to EFSEC on pre-design and pre-construction data collection requirements to address Project mitigation measures and conditions of management plans
- Review and provide advice to EFSEC on the final Project design
- Advising on thresholds to be applied to the Project that would trigger the requirement for additional mitigation measures
- Advising on the monitoring of mitigation effectiveness and reviewing monitoring reports
- Advising on additional or new mitigation measures that would be implemented by the Applicant to address exceedances of thresholds
- Reviewing the results of annual data generated from surveys and incidental observations and providing recommendations for alternative mitigation and adaptive management strategies, as well as advising on aspects of existing mitigation that are no longer needed.

The mitigation measure avoids and reduces impacts to wildlife and habitat including habitat loss, wildlife disturbance, barriers to movement, and wildlife mortality; and allows for continued monitoring and adaptive management of potential Project related impacts.

Hab-5: As noted by the Applicant, the Project is expected to result in indirect habitat loss through loss of habitat function and changes in wildlife behavior in response to the Project. Further, as noted by the Applicant, WDFW guidelines require that compensatory habitat mitigation must fully offset the loss of habitat function and value. To address indirect habitat loss associated with the Project, the Applicant would develop an Indirect Habitat Loss Management Plan that addresses potential indirect habitat loss resulting from the Project. The Applicant would work with EFSEC and the Project TAC during the development of the Indirect Habitat Loss Management Plan (IHLMP) for review. EFSEC and the TAC would review the IHLMP prior to its implementation. The IHLMP would be provided to the TAC for review 90 days prior to construction.

The objectives of the IHLMP would be to identify Project-specific ZOI and required mitigation based on the Project-specific ZOI. The Project-specific ZOI would be developed based on Project conditions and may differ from the ZOI presented in the Draft EIS. The IHLMP would include:

- A description of the study's purpose and objectives
- A description of methods to define Project-specific ZOIs (e.g., gradient analysis, nest density)
- A description of data requirements to establish Project-specific ZOIs and field programs that would be implemented (pre-construction and post-operation)

- A description of the duration of studies required to establish Project-specific ZOIs
- A description of criteria to be used to compensate for loss of habitat function and value
- An environmental effectiveness monitoring strategy of compensatory habitat to ensure that the habitat meets success criteria

The IHLMP would also include a series of compensatory site-selection criteria, developed in consultation with the TAC. The selection criteria would be used to evaluate candidate habitat compensation habitats. Habitats that achieve more of the criteria would be identified as the preferential sites. Selection criteria would include, at a minimum:

- Proximity to the Lease Boundary (e.g., hierarchy of preferences with respect to location—namely, within the Lease Boundary being the highest priority, adjacent to the Lease Boundary being the second highest priority, and off site being the third priority)
- Protection of existing native shrub-steppe or grassland habitats
- Encompassing sensitive or important wildlife habitat (e.g., mapped movement corridors, ferruginous hawk core habitat, habitat concentration areas, areas of high prey abundance)
- Proximity to Project infrastructure

The mitigation measure avoids and reduces disturbance to wildlife (indirect habitat loss) while allowing for ongoing monitoring, adaptive management, and offsetting of potential Project related impacts.

Hab-6: **Final Design:** The Applicant would work with the TAC and EFSEC on the development of the final Project layout and design including the application of Applicant commitments and recommended mitigation measures. The mitigation measure avoids and reduces potential habitat loss and disturbance to wildlife (indirect habitat loss).

Hab-7: All roadways constructed for the Project during the construction and operation phases would be removed and restored during decommissioning. The Applicant would provide EFSEC with rationale and propose additional mitigation measures if roadways are not decommissioned post-operation. The mitigation measure restores habitat post-operation and reduces habitat loss.

In addition to the wildlife and habitat mitigation measures the following measures developed for the Vegetation chapter are applicable to wildlife and habitat.

Veg[21]-1: Tree Avoidance: Construction would avoid removing or disturbing trees within the Project Lease Boundary. Disturbance to trees includes any disturbance, including topping, within the drip-line of the tree (i.e., the area from the edge of the outermost branches), which preserves an intact root system. Disturbance within the drip-line of the tree should be avoided as this can lead to tree mortality. The avoidance area within the drip-line of trees in work areas should be delineated using snow fencing or similar measure to improve the visibility of avoidance zones. Trees cannot be disturbed or removed without pre-approval. Where disturbance trees by the Project cannot be avoided (e.g., near transmission lines), the number and location of the trees would be provided to EFSEC, along with a statement justifying

[21] Veg-: Identifier of numbered mitigation item for Vegetation, as described in Section 4.5

why avoidance cannot be achieved, and a mitigation plan. The mitigation plan would include replanting trees within the Lease Boundary to maintain the diversity of habitat structures provided by trees and would require approval by EFSEC prior to proceeding. The mitigation measure avoids physical disturbance to trees, which provides structural diversity for wildlife habitat.

Veg-4: **As-Built Report and Offset Calculation:** Within 60 days of completing construction, the Applicant would provide an as-built report that documents the amount of temporary and permanent disturbance associated with the Project. This would include associated maps and georeferenced spatial files. The as-built report would be factored into the final calculation of habitat offset based on the Applicant-provided ratios. The acreages of modified habitat planted for the Project under the solar arrays would also be included in this report. EFSEC would determine the number of years that vegetation monitoring of temporary disturbance and modified habitat would be conducted and the success criteria for revegetation. The success criteria would include measurable parameters that the Applicant would measure to determine whether successful revegetation has occurred. The Applicant would submit annual reports for each year of vegetation monitoring following construction to document the success of revegetation. At the end of the vegetation monitoring period, as determined by EFSEC, areas of modified habitat and revegetated temporary disturbance that have met the success criteria would be eligible for offset by the Applicant at the respective ratios. Any areas of modified habitat or temporary disturbance that do not meet the success criteria after completion of revegetation monitoring would be considered permanent disturbance, and this would be added to the offset requirement. The mitigation measure addresses habitat offset by requiring a final calculation of offset requirements based on actual disturbance.

Veg-7: **Detailed Site Restoration Plan:** The Detailed Site Restoration Plan (DSRP) would include a description of revegetation to be undertaken during decommissioning. The DSRP would be prepared and submitted for approval by EFSEC for the final revegetation following Project decommissioning for the temporary and permanent disturbance areas, including modified habitat. The DSRP would be a living document. It would include the methods, success criteria, monitoring, and reporting for revegetation at the end of the Project's life. It would also include provisions for adaptive management and would be updated based on learnings from implementing the Revegetation Plan created for the temporary disturbance from Project Construction (Appendix N; Horse Heaven Wind Farm, LLC 2021a). The mitigation measure provides specifications on the Detailed Site Restoration Plan during decommissioning.

Recommended Mitigation Measures for Special Status Species

Table 4.6-9 summarizes the mitigation measures recommended by EFSEC that are specific to special status species. These measures, in combination with those described above, would reduce potential Project-related impacts on these species.

Table 4.6-9: Recommended Mitigation Measures for Special Status Species

Mitigation Identifier	Species Name	Species-specific Mitigation
Spec-1	Striped whipsnake Sagebrush lizard	The Applicant would conduct pre-construction surveys for sensitive reptile species prior to alteration or destruction of suitable habitat such as areas within the Lease Boundary identified as core habitat in GAP mapping, as well as shrubland (e.g., shrub-steppe, rabbitbrush). WDFW would be contacted prior to undertaking these surveys. If these species are identified through pre-construction surveys, the Applicant would prepare a Reptile Management Plan to reduce potential impacts on habitat, mortality, and barriers to movement. The Reptile Management Plan would describe: ▪ How the Applicant would avoid suitable habitat, including where the species were observed ▪ How the Applicant would implement management recommendations in Larsen (1997) ▪ How the Applicant would maintain rodent burrows in suitable reptile habitat (e.g., shrub-steppe) ▪ Additional mitigation measures that would be implemented to reduce potential mortality of these species during the construction and operation stages of the Project The Reptile Management Plan would be reviewed by the TAC and approved by EFSEC prior to initiation of construction. Survey results and proposed adaptive management would be reviewed by the TAC prior to implementation (see Hab-4). The mitigation measure avoids and reduces potential striped whipsnake and sagebrush lizard habitat loss and mortality while allowing for adaptive management through Project construction and operation.
Spec-2	American white pelican	The Applicant would maintain a database of American white pelicans observed flying over or landing in the Project Lease Boundary. Observational data would be reviewed with the TAC annually, and adaptive management strategies would be applied as needed. The mitigation measure allows for adaptive management of potential American white pelican mortality through Project operation.
Spec-3	Eagles	The Applicant would obtain any required federal approvals. The Applicant would continue ongoing coordination with the USFWS (Eagle Coordinator, Columbia Pacific Northwest Region) regarding an eagle take permit for incidental take of bald and golden eagles and would continue to evaluate eagle risk to determine if an eagle take permit is appropriate considering the use of the Project by bald and golden eagles. Apply WDFW-recommended buffers for bald eagle and golden eagle nests (Larsen et al. 2004): ▪ Bald eagle - protected zone (400 feet) and conditioned zone (up to 800 feet beyond the protected zone) ▪ Golden eagle – 1.9 miles The mitigation measure avoids and reduces potential disturbance of eagle nests and eagle mortality.

Table 4.6-9: Recommended Mitigation Measures for Special Status Species

Mitigation Identifier	Species Name	Species-specific Mitigation
Spec-4	Burrowing owl	The Applicant would conduct burrowing owl surveys within areas of direct loss (permanent, temporary, and modified) and associated ZOIs. The results of these surveys would be provided to the TAC and EFSEC and used to inform the final Project layout. Active burrows would be retained and satellite burrows with characteristics used by burrowing owls would be avoided where feasible to maintain habitat capacity. Apply WDFW-recommended seasonal buffers (0.5 miles) (Larsen et al. 2004) for burrowing owl nests to avoid disturbing nesting burrowing owls, if present. Seasonal buffers (February 15 to September 25) would be applied during construction and for temporary disturbances, such as periodic maintenance, during operation. If active burrowing owls are identified in the Lease Boundary, the Applicant would develop a species-specific management plan that describes: ▪ The location of active burrows ▪ How active burrows would be avoided through re-alignment or reconfiguration of Project features ▪ Additional mitigation measures that would be applied where disturbance to active burrows is expected (e.g., construction of artificial burrows) ▪ Ongoing monitoring of active burrows The Burrowing Owl Management Plan would be reviewed by the TAC and approved by EFSEC prior to initiation of construction. Survey results and proposed adaptive management would be reviewed by the TAC prior to implementation (see Hab-4). The Applicant would monitor access roads for burrowing owl use and mortalities. Mortalities would be reported to the TAC and EFSEC within 5 days of the observation. Incidental observations of burrowing owl use would be provided to the TAC on an annual basis. The mitigation measure avoids and reduces potential loss of burrowing owl habitat, disturbance to burrowing owls, and burrowing owl mortality, while allowing for adaptive management through Project construction and operation.
Spec-5	Ferruginous hawk	The Applicant would avoid siting Project components within 2 miles of ferruginous hawk nests documented in PHS data and in Horse Heaven Wind Farm, LLC (2021a) to preserve foraging habitat. In the event that a Project component is sited within the 2-mile buffer, the Applicant would, in consultation with the TAC and approved by EFSEC, develop a Project-specific ferruginous hawk mitigation and management plan that includes: 1. A description of efforts to site Project infrastructure to avoid core habitat, identified as the area within 2 miles of nests documented in PHS data and Horse Heaven Wind Farm, LLC (2021a): a. If Project components are sited within 2 miles of a ferruginous hawk nest, the infrastructure would be reviewed by the TAC and approved by EFSEC. b. Additional mitigation measures would be developed to reduce potential ferruginous hawk strikes with turbines, including curtailing turbine operation within the 2-mile core habitat of any actively occupied nests during the breeding and rearing periods when ferruginous hawks are present in Benton County.

Table 4.6-9: Recommended Mitigation Measures for Special Status Species

Mitigation Identifier	Species Name	Species-specific Mitigation
		c. The plan would explain how and where the Applicant would create offsetting habitat for direct and indirect habitat loss within the 2-mile core habitat of ferruginous hawk nests documented in PHS data and in Horse Heaven Wind, LLC (2021a). 2. A description of how construction activities would be undertaken to avoid sensitive timing periods for ferruginous hawk. 3. A description of pre- and post-monitoring programs, that would be conducted at active ferruginous hawk territories to establish: a. Habitat use in the Lease Boundary. b. Mapping of ground squirrel colonies and other prey items. c. Identification of potential flyways between nest sites and foraging habitat and monitoring of potential flyways to inform final turbine siting and orientation. d. Ongoing monitoring of nest occupation and success. 4. A description of restoration activities that would be undertaken in disturbed areas to enhance ferruginous hawk habitat during Project decommissioning. The mitigation measure avoids and reduces potential loss of ferruginous hawk habitat, disturbance to ferruginous hawk, and ferruginous hawk mortality, while allowing for adaptive management through Project construction and operation.
Spec-6	Great blue heron Sandhill crane Tundra swan	The Applicant would maintain a database of incidental observation of great blue heron, sandhill crane, and tundra swan foraging in the Lease Boundary during operation. Observational data and proposed adaptive management strategies would be reviewed with the TAC annually (see Hab-4). The Applicant would reduce the use of overhead power lines, where possible. The Applicant would apply buffers recommended in Larsen et al (2004)[(a)] sandhill crane feeding areas (0.5 miles) and roosting areas (0.3 miles), if documented in the Lease Boundary. The mitigation measure avoids and reduces potential disturbance to and mortality of great blue heron, sandhill crane and tundra swan, while allowing for adaptive management through Project construction and operation.
Spec-7	Loggerhead shrike Sagebrush sparrow Sage thrasher Vaux's swift	The Applicant would maintain connectivity between natural habitat patches to reduce potential habitat loss and fragmentation. The Applicant would restore areas with shrubs, where feasible, to reduce potential habitat loss. The Applicant would avoid the use of insecticides and herbicides to reduce potential mortality and loss of prey items. The Applicant would retain trees, shrubs, and hedgerows, as feasible, to reduce habitat loss. The Applicant would consult with the TAC and EFSEC if suitable habitat for loggerhead shrike, sagebrush sparrow, and sage thrasher cannot be avoided. If suitable habitat cannot be avoided, the Applicant would, in consultation with the TAC and approved by EFSEC, develop nest set back buffers that are supported by literature to be applied during clearing and grubbing activities. The Applicant would avoid clearing and grubbing during the active nesting period to reduce potential destruction of active nests and disturbance of nesting birds. If clearing and grubbing occurs during the nesting season, the Applicant would

Table 4.6-9: Recommended Mitigation Measures for Special Status Species

Mitigation Identifier	Species Name	Species-specific Mitigation
		conduct pre-clearing surveys for active nests and maintain appropriate setback buffers around active nests. Observational data and proposed adaptive management strategies would be reviewed with the TAC annually (see Hab-4). The mitigation measure avoids and reduces potential habitat loss, habitat fragmentation, and mortality to avoid and reduce impacts to loggerhead shrike, sagebrush sparrow, sage thrasher, and Vaux's swift. The measure allows for adaptive management through Project construction and operation.
Spec-8	Prairie falcon	The Applicant would conduct pre-construction surveys for prairie falcon nests for construction work proposed during the prairie falcon nesting season and maintain a seasonal buffer of 2,640 feet from active nest sites (Larsen et al. 2004) to reduce potential destruction or disturbance of active nests. Observational data and proposed adaptive management strategies would be reviewed with the TAC annually (see Hab-4). The mitigation measure avoids and reduces potential disturbance to prairie falcon, and prairie falcon mortality, while allowing for adaptive management through Project construction and operation.
Spec-9	Ring-necked pheasant	The Applicant would consider using native grasses and legumes that support ring-necked pheasant in seed mixes applied during post-construction restoration of temporary disturbances and decommissioning to reduce potential habitat loss (Larsen et al. 2004). Observational data and proposed adaptive management strategies would be reviewed with the TAC annually (see Hab-4). The mitigation measure reduces potential loss of ring-necked pheasant habitat and allows for adaptive management through Project construction and operation.
Spec-10	Black-tailed jackrabbit White-tailed jackrabbit	The Applicant would conduct surveys for jackrabbit in suitable habitat identified through GAP predictive mapping. If jackrabbits are identified, the Applicant would develop and implement a management plan with additional mitigation measures to reduce potential loss of habitat supporting jackrabbits. Observational data and proposed adaptive management strategies would be reviewed with the TAC annually (see Hab-4). The mitigation measure reduces potential loss of black-tailed and white-tailed jackrabbit habitat, indirect habitat loss, habitat fragmentation, and mortality, while allowing for adaptive management through Project construction and operation.
Spec-11	Townsend's big-eared bat	The Applicant would restrict bat access to open water if the water could be contaminated. The Applicant would retain old buildings, outbuildings, and trees where feasible. The Applicant would report mortalities of Townsend's big-eared bat to EFSEC and the TAC. Bat mortality data and adaptive management strategies would be reviewed with the TAC annually (see Hab-4). The mitigation measure reduces potential loss of Townsend's big-eared bat habitat and mortality and allows for adaptive management through Project construction and operation.

Table 4.6-9: Recommended Mitigation Measures for Special Status Species

Mitigation Identifier	Species Name	Species-specific Mitigation
Spec-12	Townsend's ground squirrel	The Applicant would conduct surveys for Townsend's ground squirrel colonies in areas of the Project disturbance footprint (including ZOI) to inform final design. The Applicant would consider how to avoid habitat loss within Townsend's ground squirrel habitat concentration areas, as well as known colonies in final design. Additional Townsend's ground squirrel colonies identified through surveys would be shown on Project mapping, and a species-specific management plan would be developed for areas where avoidance is not feasible. This plan would provide rationale for why colonies cannot be avoided and would provide additional mitigation measures, such as colony relocation and reconstruction of habitat features. The plans would be provided and discussed with the TAC, and approved by EFSEC, if avoidance of identified ground squirrel colonies is not feasible. Observational data and adaptive management strategies would be reviewed with the TAC annually. The mitigation measure reduces potential loss of Townsend's ground squirrel habitat, disturbance of squirrel colonies, and Townsend's ground squirrel mortality, while allowing for adaptive management through Project construction and operation.
Spec-13	Pronghorn antelope	The Applicant would limit fencing where feasible (e.g., around solar arrays). Final fencing layouts and design, including use of non-barbed-wire security fencing, would be provided to the TAC and EFSEC with rationale for fencing requirements. The Applicant would design and implement a study of seasonal pronghorn antelope occurrence and use of the Lease Boundary pre-construction and during operation to document the change, if any, of pronghorn antelope presence, abundance, and habitat use in the Lease Boundary. The TAC would review and provide input to the study design. The results of the study would be used to develop adaptive management measures to respond to changes in pronghorn antelope habitat use. Survey results and proposed adaptive management would be reviewed by the TAC prior to implementation (see Hab-4) The Applicant would maintain a database of pronghorn antelope observations, including details such as numbers, location, age, and sex, and would make this database available to WDFW, EFSEC, and the Yakama Nation. The mitigation measure reduces potential disturbance to pronghorn antelope and barriers to pronghorn antelope movement, while allowing for adaptive management through Project construction and operation.

Notes:
[a] Larsen et al. (2004) recommends buffers around great blue heron colonies, which do not occur in the Lease Boundary and does not provide recommended buffers for Tundra swan.
ASC = Application for Site Certification; EFSEC = Washington Energy Facility Site Evaluation Council; TAC = Technical Advisory Committee; USFWS = U.S. Fish and Wildlife Service; WDFW = Washington Department of Fish and Wildlife; ZOI = zone of influence

Summary of Milestones and Timing

Table 4.6-10 summarizes wildlife and habitat mitigation milestones and the timing of when milestones would be met.

Table 4.6-10: Summary of Milestones

Timing	Mitigation Measure	Milestone
Construction		
One year prior to construction	**Hab-4**	Establishment of TAC
During appropriate season within 1 year prior to construction	**Spec-1, 4, 8, 10, 12**	Pre-construction surveys
180 days prior to construction	**Hab-6**	Final design
90 days prior to construction	**Hab-1**	Corridor Mitigation Plan, if necessary
90 days prior to construction	**Hab-2**	Rational for and mitigation of canyon and draw crossings
90 days prior to construction	**Wild-8**	Raptor Nest Monitoring and Management Plan
90 days prior to construction	**Hab-5**	Indirect Habitat Loss Management Plan
90 days prior to construction, if needed	**Spec-5**	Ferruginous hawk mitigation and management plan
60 days prior to initiation of surveys (pre-construction).	**Spec-13**	Pronghorn antelope seasonal study
60 days prior to construction, if needed	**Spec 1, 4, 10, 12**	Species specific management plans
Prior to construction	**Wild-5**	Flagging sensitive features and habitat
Prior to construction	**Wild-9**	Pre-construction bird nest surveys, if necessary
Operation		
60 days post-construction	**Veg-4**	As-built report and offset calculation
Two years after commencement of operation	**Wild-1**	Review of PCFM results
Annually during operation	**Wild-6**	Review mortality database and provide mitigation
Annually during operation	**Spec-2, 4, 6, 7, 8, 9, 12**	Incidental databases
Annually during operation	**Spec-11**	Townsend’s big-eared bat mortality database
Decommissioning		
60 days prior to initiation of decommissioning	**Veg-7**	Detailed Site Restoration Plan
60 days prior to initiation of decommissioning	**Hab-7**	Rational for and mitigation of remaining roadways, if any.

PCFM = post-construction fatality monitoring; TAC = Technical Advisory Committee

4.6.2.6 Significant Unavoidable Adverse Impacts

Determining the significance of an impact involves context and intensity, which, in turn depends on the magnitude and duration of an impact. “Significant” in the Washington State Environmental Policy Act means a reasonable likelihood of more than a moderate adverse impact on environmental quality. An impact may also be significant if its chance of occurrence is not great, but the resulting environmental impact would be severe if it occurred (WAC 197-11-794).

This Draft EIS weighs the impacts on wildlife and habitat that may result from the Proposed Action with mitigation measures, and makes a resulting determination of significance for each impact in **Tables 4.6-11a, 4.6-11b, and 4.6-11c**.

Table 4.6-11a: Summary of Potential Impacts on Wildlife and Habitat during Construction of the Proposed Project

Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact: • Negligible • Low • Medium • High	Duration of Impact: • Temporary • Short Term • Long Term • Constant	Likelihood of Impact: • Unlikely • Feasible • Probable • Unavoidable	Spatial Extent or Setting of Impact: • Limited • Confined • Local • Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Habitat Loss	Turbine Option 1 Turbine Option 2 **Comprehensive Project**	The Project would result in the direct loss of habitat through construction of the Wind Energy Micrositing Corridor and associated transportation routes. The Project may also result in indirect habitat loss through increased noise, light, and human presence during construction.	Medium	Short Term for temporary disturbances (e.g., construction laydown areas) Constant for permanent footprint loss (e.g., turbine footprint)	Unavoidable	Local	**Wild-5:** Limit construction disturbance by identifying sensitive areas. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-3:** Temporary laydown areas. **Hab-4:** Develop TAC. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-1:** Tree Avoidance.	None identified
Habitat Loss	Solar Arrays	The Project would result in the direct loss of habitat, including modified habitat, through construction of the solar arrays and associated transportation routes. The Project may also result in indirect habitat loss through increased noise, light, and human presence during construction.	Medium	Short Term for temporary disturbances (e.g., construction laydown areas) and modified habitat under the solar fields Constant for permanent footprint loss.	Unavoidable	Confined	**Wild-5:** Limit construction disturbance by identifying sensitive areas. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-3:** Temporary laydown areas **Hab-4:** Develop TAC. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-1:** Tree Avoidance.	None identified
Habitat Loss	BESSs Substations	The Project would result in the direct loss of habitat through construction of the BESSs, substations, and associated transportation routes. The Project may also result in indirect habitat loss through increased noise, light, and human presence during construction.	Low	Short Term for temporary disturbances (e.g., construction laydown areas) Long Term for permanent footprint loss.	Unavoidable	Limited	**Wild-5:** Limit construction disturbance by identifying sensitive areas. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-3:** Temporary laydown areas. **Hab-4:** Develop TAC. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-1:** Tree Avoidance.	None identified

Table 4.6-11a: Summary of Potential Impacts on Wildlife and Habitat during Construction of the Proposed Project

Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact: • Negligible • Low • Medium • High	Duration of Impact: • Temporary • Short Term • Long Term • Constant	Likelihood of Impact: • Unlikely • Feasible • Probable • Unavoidable	Spatial Extent or Setting of Impact: • Limited • Confined • Local • Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Mortality of non-special status species	Turbine Option 1 Turbine Option 2 **Comprehensive Project**	The Project may result in mortality of smaller animals (e.g., birds, herptiles, small mammals) during clearing and ground preparation works. Wildlife-vehicle collisions may occur during Project construction due to increased traffic.	Low	Short Term	Feasible	Confined	**Wild-1:** Review 2-year raptor and bat monitoring program. **Wild-2:** Use wildlife-proof trash containers. **Wild-3:** Review USFWS eagle mortality consultation. **Wild-4:** Avoid use of pesticides and rodenticides. **Wild-5:** Limit construction disturbance by identifying sensitive areas. **Wild-6:** Maintain database of road mortalities. **Wild-7:** schedule construction during daylight hours. **Wild-8:** Establish buffers around raptor nests. **Wild-9:** Time vegetation clearing outside of nesting season and provide mitigation for nesting birds. **Hab-4:** Develop TAC. **Hab-6:** Work with EFSEC on final Project layout and design.	None identified
Mortality of non-special status species	Solar Arrays	The Project may result in mortality of smaller animals (e.g., birds, herptiles, small mammals) during clearing and ground preparation works. Wildlife-vehicle collisions may occur during Project construction due to increased traffic.	Low	Short Term	Feasible	Limited	**Wild-1:** Review 2-year raptor and bat monitoring program. **Wild-2:** Use wildlife-proof trash containers. **Wild-3:** Review USFWS eagle mortality consultation. **Wild-4:** Avoid use of pesticides and rodenticides. **Wild-5:** Limit construction disturbance by identifying sensitive areas. **Wild-6:** Maintain database of road mortalities. **Wild-7:** Schedule construction during daylight hours. **Wild-8:** Establish buffers around raptor nests. **Wild-9:** Time vegetation clearing to avoid nesting season and mitigation of nesting birds **Hab-4:** Develop TAC.	None identified

Table 4.6-11a: Summary of Potential Impacts on Wildlife and Habitat during Construction of the Proposed Project

Topic	Component[a]	Description of Impact[b]	Magnitude of Impact: • Negligible • Low • Medium • High	Duration of Impact: • Temporary • Short Term • Long Term • Constant	Likelihood of Impact: • Unlikely • Feasible • Probable • Unavoidable	Spatial Extent or Setting of Impact: • Limited • Confined • Local • Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Mortality of non-special status species	BESSs Substations	The Project may result in mortality of smaller animals (e.g., birds, herptiles, small mammals) during clearing and ground preparation works. Wildlife-vehicle collisions may occur during Project construction due to increased traffic.	Negligible	Short Term	Feasible	Limited	**Wild-1:** Review 2-year raptor and bat monitoring program. **Wild-2:** Use wildlife-proof trash containers. **Wild-3:** Review USFWS eagle mortality consultation. **Wild-4:** Avoid use of pesticides and rodenticides. **Wild-5:** Limit construction disturbance by identifying sensitive areas. **Wild-6:** Maintain database of road mortalities. **Wild-7:** Schedule construction during daylight hours. **Wild-8:** Establish buffers around raptor nests. **Wild-9:** Time vegetation clearing outside of nesting season and provide mitigation for nesting birds. **Hab-4:** Develop TAC.	None identified
Barriers to movement and fragmentation	Turbine Option 1 Turbine Option 2 **Comprehensive Project**	Turbines, power lines, roadways, and other linear infrastructure could create barriers to wildlife movement and fragment habitat. Barriers and fragmentation created during construction would predominantly remain through operation.	Low	Long Term	Probable	Confined	**Wild-5:** Limit activity disturbance by identifying sensitive areas. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-3**: Temporary laydown areas. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design.	None identified
Barriers to movement and fragmentation	Solar Arrays	Solar arrays may impact wildlife movement and fragment habitat by bisecting movement corridors. Solar arrays would be fenced, which is expected to create a barrier to movement of larger wildlife around the arrays.	Low	Long Term	Unavoidable	Confined	**Wild-5:** Limit activity disturbance by identifying sensitive areas. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-3**: Temporary laydown areas. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design.	None identified

Table 4.6-11a: Summary of Potential Impacts on Wildlife and Habitat during Construction of the Proposed Project

Topic	Component[a]	Description of Impact[b]	Magnitude of Impact: • Negligible • Low • Medium • High	Duration of Impact: • Temporary • Short Term • Long Term • Constant	Likelihood of Impact: • Unlikely • Feasible • Probable • Unavoidable	Spatial Extent or Setting of Impact: • Limited • Confined • Local • Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Barriers to movement and fragmentation	BESSs Substations	BESSs and substations may create barriers to wildlife movement in the adjacent area.	Negligible	Long Term	Unavoidable	Limited	**Wild-5:** Limit activity disturbance by identifying sensitive areas. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-3**: Temporary laydown areas. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design.	None identified
Special status species: striped whipsnake and sagebrush lizard	Turbine Option 1 Turbine Option 2 Solar Array BESSs Substations **Comprehensive Project**	Impacts on shrub and shrub-steppe habitat may result in loss of suitable reptile habitat. Mortality of reptile species could occur during construction from heavy machinery and land clearing and grubbing.	Low	Constant	Feasible	Confined	**Wild-5:** Limit construction disturbance by identifying sensitive areas. **Wild-6**: Maintain database of road mortalities. **Hab-3**: Temporary laydown areas. **Hab-4:** Develop TAC. **Hab-6:** Work with EFSEC on final Project layout and design. **Spec-1:** Implement striped whipsnake and sagebrush lizard specific mitigation.	None identified
Special status species: American white pelican	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Construction of the Project may disturb American white pelicans moving over the Lease Boundary.	Negligible	Short Term	Unlikely	Limited	**Hab-3:** Temporary laydown areas. **Hab-4:** Develop TAC. **Hab-6:** Work with EFSEC on final Project layout and design. **Spec-2:** Implement American white pelican specific mitigation.	None identified

Table 4.6-11a: Summary of Potential Impacts on Wildlife and Habitat during Construction of the Proposed Project

Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact: • Negligible • Low • Medium • High	Duration of Impact: • Temporary • Short Term • Long Term • Constant	Likelihood of Impact: • Unlikely • Feasible • Probable • Unavoidable	Spatial Extent or Setting of Impact: • Limited • Confined • Local • Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Special status species: bald eagle	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Construction of the Project could disturb bald eagles, resulting in avoidance of the Project Site.	Negligible	Short Term	Feasible	Confined	**Wild-1:** Review 2-year raptor and bat monitoring program. **Wild-2:** Use wildlife-proof trash containers. **Wild-3:** Review USFWS eagle mortality consultation. **Wild-4:** Avoid use of pesticides and rodenticides. **Wild-5:** Limit construction. disturbance by identifying sensitive areas. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-1:** Tree Avoidance. **Spec-3:** Implement eagle specific mitigation.	None identified
Special status species: burrowing owl	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Construction may result in direct and indirect habitat loss and the destruction of burrows (active, inactive, and potential). Mortality may occur during vegetation and ground-disturbing works.	Medium	Constant (habitat loss) Short Term (disturbance, mortality)	Unavoidable (Habitat loss) Probable (disturbance) Feasible (mortality)	Confined	**Wild-1**: Review 2-year raptor and bat monitoring program. **Wild-4**: Avoid use of pesticides and rodenticides. **Wild-5:** Limit construction disturbance by identifying sensitive areas. **Wild-6**: Maintain database of road mortalities. **Wild-7:** Schedule construction during daylight hours. **Wild-8**: Establish buffers around raptor nests. **Wild-9**: Time vegetation clearing outside of nesting season and provide mitigation for nesting birds. **Hab-3**: Temporary laydown areas **Hab-4:** Develop TAC. **Hab-6:** Work with EFSEC on final Project layout and design. **Spec-4**: Implement burrowing owl specific mitigation.	None identified

Table 4.6-11a: Summary of Potential Impacts on Wildlife and Habitat during Construction of the Proposed Project

Topic	Component[a]	Description of Impact[b]	Magnitude of Impact: • Negligible • Low • Medium • High	Duration of Impact: • Temporary • Short Term • Long Term • Constant	Likelihood of Impact: • Unlikely • Feasible • Probable • Unavoidable	Spatial Extent or Setting of Impact: • Limited • Confined • Local • Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Special status species: ferruginous hawk	Turbine Option 1 Turbine Option 2 BESSs Substations **Comprehensive Project**	Construction of turbines and associated roads and power lines may result in the direct and indirect loss of habitat in core and range ferruginous hawk habitat. Nesting success could be impacted by construction activities proximal to the nest or activities change prey abundance.	High	Constant (habitat loss) Short Term (disturbance)	Unavoidable (habitat loss) Probable (disturbance)	Confined	**Wild-1:** Review 2-year raptor and bat monitoring program. **Wild-4:** Avoid use of pesticides and rodenticides. **Wild-5:** Limit construction disturbance by identifying sensitive areas. **Wild-6:** Maintain database of road mortalities. **Wild-8**: Establish buffers around raptor nests. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-3:** Temporary laydown areas. **Hab-4:** Develop TAC. **Hab-6:** Work with EFSEC on final Project layout and design. **Spec-5**: Implement ferruginous hawk specific mitigation.	None identified
Special status species: ferruginous hawk	Solar Arrays	Three historic nesting locations would be directly impacted at the East Solar Array.	Medium	Constant	Unavoidable	Limited	**Wild-1:** Review 2-year raptor and bat monitoring program. **Wild-4:** Avoid use of pesticides and rodenticides. **Wild-5:** Limit construction disturbance by identifying sensitive areas. **Wild-6:** Maintain database of road mortalities. **Wild-8:** Establish buffers around raptor nests. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-3:** Temporary laydown areas. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Spec-5**: Implement ferruginous hawk specific mitigation.	None identified

Table 4.6-11a: Summary of Potential Impacts on Wildlife and Habitat during Construction of the Proposed Project

Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact: • Negligible • Low • Medium • High	Duration of Impact: • Temporary • Short Term • Long Term • Constant	Likelihood of Impact: • Unlikely • Feasible • Probable • Unavoidable	Spatial Extent or Setting of Impact: • Limited • Confined • Local • Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Special status species: golden eagle	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Construction of the Project could disturb golden eagles, resulting in avoidance of the Project site, though golden eagle nesting has not been reported within 10 miles of the Lease Boundary.	Negligible	Short Term	Unlikely	Confined	**Wild-1**: Review 2-year raptor and bat monitoring program. **Wild-2**: Use wildlife-proof trash containers. **Wild-3**: Review USFWS eagle mortality consultation. **Wild-4**: Avoid use of pesticides and rodenticides. **Wild-5:** Limit construction disturbance by identifying sensitive areas. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Veg-1:** Tree Avoidance. **Spec-3:** Implement eagle specific mitigation.	None identified
Special status species: great blue heron and sandhill crane	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Construction may disturb birds flying over the Lease Boundary, resulting in bird flight paths being diverted around the area. Construction may result in the loss of foraging habitat.	Negligible	Long Term (habitat loss) Short Term (construction disturbance, construction mortality)	Unavoidable (habitat loss) Feasible (disturbance, mortality)	Confined	**Wild-1**: Review 2-year raptor and bat monitoring program. **Wild-4**: Avoid use of pesticides and rodenticides. **Wild-5:** Limit construction disturbance by identifying sensitive areas. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Spec-6**: Implement great blue heron, sandhill crane, and tundra swan specific mitigation.	None identified

Table 4.6-11a: Summary of Potential Impacts on Wildlife and Habitat during Construction of the Proposed Project

Topic	Component[a]	Description of Impact[b]	Magnitude of Impact: • Negligible • Low • Medium • High	Duration of Impact: • Temporary • Short Term • Long Term • Constant	Likelihood of Impact: • Unlikely • Feasible • Probable • Unavoidable	Spatial Extent or Setting of Impact: • Limited • Confined • Local • Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Special status species: loggerhead shrike	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Construction may result in direct and indirect (disturbance) habitat loss. Mortality may occur from interactions with machinery and destruction of nests.	Low	Constant (habitat loss) Short Term (construction disturbance, construction mortality)	Unavoidable (Habitat loss) Probable (disturbance, mortality)	Confined	**Wild-4**: Avoid use of pesticides and rodenticides. **Wild-5:** Limit disturbance by identifying sensitive areas. **Wild-6**: Maintain database of road mortalities. **Wild-7:** Schedule construction during daylight hours. **Wild-9**: Time vegetation clearing outside of nesting season and provide mitigation for nesting birds. **Hab-2:** Minimize transmission line crossings. **Hab-3**: Temporary laydown areas. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on Final Project layout and design. **Spec-7:** Implement loggerhead shrike, sagebrush sparrow, sage thrasher, and Vaux's swift specific mitigation.	None identified
Special status species: prairie falcon	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Construction of the Project is predicted to result in the direct loss of suitable foraging habitat for prairie falcon. Disturbance from construction activities may result in disturbance to prairie falcons.	Medium	Constant (habitat loss) Short Term (construction disturbance, construction mortality)	Unavoidable (Habitat loss) Probable (disturbance, mortality)	Confined	**Wild-1**: Review 2-year raptor and bat monitoring program. **Wild-4**: Avoid use of pesticides and rodenticides. **Wild-5:** Limit construction disturbance by identifying sensitive areas. **Wild-6**: Maintain database of road mortalities. **Wild-8**: Establish buffers around raptor nests. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-3**: Temporary laydown areas. **Hab-4:** Develop TAC. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-1:** Tree Avoidance. **Spec-8**: Implement prairie falcon specific mitigation.	None identified

Table 4.6-11a: Summary of Potential Impacts on Wildlife and Habitat during Construction of the Proposed Project

Topic	Component[a]	Description of Impact[b]	Magnitude of Impact: • Negligible • Low • Medium • High	Duration of Impact: • Temporary • Short Term • Long Term • Constant	Likelihood of Impact: • Unlikely • Feasible • Probable • Unavoidable	Spatial Extent or Setting of Impact: • Limited • Confined • Local • Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Special status species: ring-necked pheasant	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Construction of the Project is predicted to result in the direct loss of suitable foraging habitat for ring-necked pheasant. Disturbance from construction activities may result in indirect habitat loss. Access roads may result in collisions with ring-necked pheasants.	Low	Long Term (habitat loss) Short Term (construction disturbance, construction mortality)	Unavoidable (habitat loss) Probable (disturbance, mortality)	Confined	**Wild-5:** Limit disturbance by identifying sensitive areas. **Wild-6**: Maintain database of road mortalities. **Wild-9**: Time vegetation clearing outside of nesting season and provide mitigation for nesting birds. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Spec-9**: Implement ring-necked pheasant specific mitigation.	None identified
Special status species: sagebrush sparrow sage thrasher	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Construction may result in direct and indirect habitat loss. Mortality may occur from interactions with machinery and destruction of nests.	Low	Constant (habitat loss) Short Term (construction disturbance, construction mortality)	Unavoidable (Habitat loss) Probable (disturbance, mortality)	Confined	**Wild-4**: Avoid use of pesticides and rodenticides. **Wild-5:** Limit disturbance by identifying sensitive areas. **Wild-6**: Maintain database of road mortalities. **Wild-7:** Schedule construction during daylight hours **Wild-9**: Time vegetation clearing outside of nesting season and provide mitigation for nesting birds. **Hab-2:** Minimize transmission line crossings. **Hab-3**: Temporary laydown areas. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Spec-7:** Implement loggerhead shrike, sagebrush sparrow, sage thrasher, and Vaux's swift specific mitigation.	None identified

Table 4.6-11a: Summary of Potential Impacts on Wildlife and Habitat during Construction of the Proposed Project

Topic	Component[a]	Description of Impact[b]	Magnitude of Impact: • Negligible • Low • Medium • High	Duration of Impact: • Temporary • Short Term • Long Term • Constant	Likelihood of Impact: • Unlikely • Feasible • Probable • Unavoidable	Spatial Extent or Setting of Impact: • Limited • Confined • Local • Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Special status species: tundra swan	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Construction may result in the disturbance and loss of suitable foraging habitat and disruption of birds flying over the Lease Boundary.	Low	Long Term (habitat loss) Short Term (construction disturbance, construction mortality)	Unavoidable (habitat loss) Feasible (disturbance, mortality)	Confined	**Wild-1**: Review 2-year raptor and bat monitoring program. **Wild-4**: Avoid use of pesticides and rodenticides. **Wild-5:** Limit construction disturbance by identifying sensitive areas. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Spec-6**: Implement great blue heron, sandhill crane, and tundra swan specific mitigation.	None identified
Special status species: Vaux's swift	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Construction of the Project could disturb Vaux's swift in flight over the Lease Boundary.	Negligible	Short Term	Unlikely	Confined	**Wild-4**: Avoid use of pesticides and rodenticides. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Spec-7:** Implement loggerhead shrike, sagebrush sparrow, sage thrasher, and Vaux's swift specific mitigation.	None identified
Special status species: black-tailed jackrabbit white-tailed jackrabbit	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Construction of the Project is predicted to result in the direct loss of suitable habitat for jackrabbit. Disturbance from construction activities may result in indirect habitat loss. Access roads may result in collisions with jackrabbits, barriers to movement, and increased fragmentation.	Low	Constant (habitat loss) Short Term (construction disturbance, construction mortality)	Unavoidable (habitat loss) Probable (disturbance, mortality)	Confined	**Wild-4**: Avoid use of pesticides and rodenticides. **Wild-5:** Limit disturbance by identifying sensitive areas. **Wild-6**: Maintain database of road mortalities. **Hab-1:** Avoid corridors. **Hab-3**: Temporary laydown areas. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Spec-10:** Implement black and white-tailed jackrabbit specific mitigation.	None identified
Special status species: Townsend's big-eared bat	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Construction activities could disturb Townsend's big-eared bat foraging in the Lease Boundary.	Negligible	Short Term	Feasible	Confined	**Wild-4**: Avoid use of pesticides and rodenticides. **Wild-7:** Schedule construction during daylight hours. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Spec-11:** Implement Townsend's big-eared bat specific mitigation.	None identified

Table 4.6-11a: Summary of Potential Impacts on Wildlife and Habitat during Construction of the Proposed Project

Topic	Component(a)	Description of Impact(b)	Magnitude of Impact: • Negligible • Low • Medium • High	Duration of Impact: • Temporary • Short Term • Long Term • Constant	Likelihood of Impact: • Unlikely • Feasible • Probable • Unavoidable	Spatial Extent or Setting of Impact: • Limited • Confined • Local • Regional	Mitigation(c)	Significant Unavoidable Adverse Impacts(d)
Special status species: Townsend's ground squirrel	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Construction of the Project and associated access roads are predicted to result in the loss of suitable Townsend's ground squirrel habitat and destruction of colonies. Mortality may occur during construction work proximal to colonies and along access roads.	Medium	Constant (habitat loss) Short Term (construction disturbance, construction mortality)	Unavoidable (habitat loss) Probable (disturbance, mortality)	Confined	**Wild-4**: Avoid use of pesticides and rodenticides. **Wild-5:** Limit disturbance by identifying sensitive areas. **Wild-6**: Maintain database of road mortalities. **Hab-1:** Avoid corridors. **Hab-3**: Temporary laydown areas. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Spec-12:** Implement Townsend's ground squirrel specific mitigation.	None identified
Special status species: pronghorn antelope	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Construction is predicted to result in direct loss of pronghorn antelope habitat. Activity associated with construction may result in indirect habitat loss. Increased traffic on existing and new access roads may result in pronghorn antelope mortality.	Medium	Constant (habitat loss) Short Term (construction disturbance)	Unavoidable (habitat loss) Probable (disturbance)	Confined	**Wild-5:** Limit disturbance by identifying sensitive areas. **Wild-6**: Maintain database of road mortalities. **Hab-1:** Avoid corridors. **Hab-3**: Temporary laydown areas. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Spec-13:** Implement pronghorn antelope specific mitigation.	None identified

Notes:
(a) The impacts related to each component including "comprehensive Project" were rated separately; components were combined in the same cell if they received the same impact ratings for the identified topic.
(b) Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.
(c) Mitigation measures listed here are additional actions that EFSEC could impose to further reduce the impacts. See Section 4.1 for details.
(d) Significant unavoidable impacts are those that would remain even after all identified additional mitigation measures have been required by EFSEC.
BESS = battery energy storage system; EFSEC = Washington Energy Facility Siting Evaluation Council; EFSEC = Washington Energy Facility Site Evaluation Council; NA = not applicable; TAC = Technical Advisory Committee; ZOI = zone of influence

Table 4.6-11b: Summary of Potential Impacts on Wildlife and Habitat during Operation of the Proposed Project

Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact: • Negligible • Low • Medium • High	Duration of Impact: • Temporary • Short Term • Long Term • Constant	Likelihood of Impact: • Unlikely • Feasible • Probable • Unavoidable	Spatial Extent or Setting of Impact: • Limited • Confined • Local • Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Habitat loss	Turbine Option 1 Turbine Option 2 **Comprehensive Project**	The Project would result in the direct loss of habitat through operation of the turbines and associated infrastructure. The Project may result in indirect habitat loss through degradation of habitat in ZOI created by disturbances (e.g., noise, light) from turbines and associated infrastructure.	Medium	Constant	Unavoidable	Local	**Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-1:** Tree Avoidance. **Veg-4:** As-built report and offset calculation.	None identified
Habitat loss	Solar Arrays	The Project would result in the direct loss of habitat through operation of the solar arrays and associated infrastructure. The Project may result in indirect habitat loss through degradation of habitat in ZOI created by disturbances from solar arrays and associated infrastructure.	Medium	Constant	Unavoidable	Confined	**Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-1:** Tree Avoidance. **Veg-4:** As-built report and offset calculation.	None identified
Habitat Loss	BESSs Substations	The Project would result in the direct loss of habitat through operation of the BESSs and substations. The operation of the BESSs and substations may also result in indirect habitat loss through degradation of habitat in the 0.5-mile ZOI created by disturbances from these features.	Negligible	Long Term	Unavoidable	Limited	**Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-1:** Tree Avoidance. **Veg-4:** As-built report and offset calculation.	None identified

Table 4.6-11b: Summary of Potential Impacts on Wildlife and Habitat during Operation of the Proposed Project

Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact: • Negligible • Low • Medium • High	Duration of Impact: • Temporary • Short Term • Long Term • Constant	Likelihood of Impact: • Unlikely • Feasible • Probable • Unavoidable	Spatial Extent or Setting of Impact: • Limited • Confined • Local • Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Mortality of non-special status species	Turbine Option 1 Turbine Option 2 **Comprehensive Project**	The Project may result in mortality of aerial species (birds and bats) through collisions with turbines, strikes with power lines, windows, and weather towers. Other sources of mortality on wildlife, including non-aerial species, include vehicle collisions and changes in food availability.	Medium	Long Term	Probable	Confined	**Wild-1:** Review 2-year raptor and bat monitoring program. **Wild-2:** Use wildlife-proof trash containers. **Wild-3:** Review USFWS eagle mortality consultation. **Wild-4:** Avoid use of pesticides and rodenticides. **Wild-6:** Maintain database of road mortalities. **Hab-4:** Develop TAC. **Hab-6:** Work with EFSEC on final Project layout and design.	None identified
Mortality of non-special status species	Solar Arrays	Bird species, particularly water-associated species, may collide with solar arrays. Mortality of other species, such as herptile, could occur depending on conditions under the solar facilities.	Low	Long Term	Feasible	Confined	**Wild-1**: Review 2-year raptor and bat monitoring program. **Wild-2**: Use wildlife-proof trash containers. **Wild-3**: Review USFWS eagle mortality consultation. **Wild-4**: Avoid use of pesticides and rodenticides. **Wild-6**: Maintain database of road mortalities. **Hab-4:** Develop TAC.	None identified
Mortality of non-special status species	BESSs Substations	Wildlife mortality may occur due to collisions with infrastructure, including BESSs and substations.	Negligible	Long Term	Unlikely	Limited	**Wild-1**: Review 2-year raptor and bat monitoring program. **Wild-2**: Use wildlife-proof trash containers. **Wild-3**: Review USFWS eagle mortality consultation. **Wild-4**: Avoid use of pesticides and rodenticides. **Wild-6**: Maintain database of road mortalities. **Hab-4:** Develop TAC.	None identified

Table 4.6-11b: Summary of Potential Impacts on Wildlife and Habitat during Operation of the Proposed Project

Topic	Component[a]	Description of Impact[b]	Magnitude of Impact: • Negligible • Low • Medium • High	Duration of Impact: • Temporary • Short Term • Long Term • Constant	Likelihood of Impact: • Unlikely • Feasible • Probable • Unavoidable	Spatial Extent or Setting of Impact: • Limited • Confined • Local • Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Barriers to movement and fragmentation	Turbine Option 1 Turbine Option 2 **Comprehensive Project**	The operation of turbines, power lines, roadways, and other linear infrastructure could result in barriers to wildlife movement and fragment habitat. Barriers and fragmentation created during construction would predominantly remain through operation.	Medium	Long Term	Probable	Confined	**Wild-5:** Limit activity disturbance by identifying sensitive areas. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation.	None identified
Barriers to movement and fragmentation	Solar arrays	The east solar field is situated on a movement corridor and may impact wildlife movement. Fencing around solar arrays is expected to create barriers for larger mammals. Herptiles, small mammals, and small birds are expected to be able to continue to access vegetation around the arrays through the fencing.	Medium	Long Term	Probable	Confined	**Wild-5:** Limit activity disturbance by identifying sensitive areas. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation.	None identified
Barriers to movement and fragmentation	BESSs Substations	BESSs and substations may create barriers to wildlife movement in the adjacent area.	Low	Long Term	Feasible	Limited	**Wild-5:** Limit activity disturbance by identifying sensitive areas. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation.	None identified
Special status species: Striped whipsnake and sagebrush lizard	Turbine Option 1 Turbine Option 2 Solar Array BESSs Substations **Comprehensive Project**	Impacts on shrub and shrub-steppe habitat may result in loss of suitable reptile habitat. Increased road networks in the Lease Boundary could increase the risk of mortality sagebrush lizard and striped whipsnake. Roadways may create barriers to reptile movement and further fragment reptile habitat.	Low	Constant	Feasible	Confined to Local	**Wild-6**: Maintain database of road mortalities. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation. **Spec-1:** Implement striped whipsnake and sagebrush lizard specific mitigation.	None identified

Table 4.6-11b: Summary of Potential Impacts on Wildlife and Habitat during Operation of the Proposed Project

Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact: • Negligible • Low • Medium • High	Duration of Impact: • Temporary • Short Term • Long Term • Constant	Likelihood of Impact: • Unlikely • Feasible • Probable • Unavoidable	Spatial Extent or Setting of Impact: • Limited • Confined • Local • Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Special status species: American white pelican	Turbine Option 1 Turbine Option 2 Solar Arrays **Comprehensive Project**	American white pelicans have the potential for collision with turbines, and electrocution with overhead transmission lines. American white pelicans could collide with solar arrays as literature suggests water-associated birds may attempt to land on solar arrays if they are mistaken for water (lake effect).	Medium	Long Term	Unlikely	Confined	**Wild-1**: Review 2-year raptor and bat monitoring program. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI.**Spec-2**: Implement American white pelican specific mitigation.	None identified
Special status species: American white pelican	BESSs Substations	Interactions with BESSs and substations are not expected.	Negligible	Long Term	Unlikely	Confined	**Wild-1**: Review 2-year raptor and bat monitoring program. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Spec-2**: Implement American white pelican specific mitigation.	None identified
Special status species: bald eagle	Turbine Option 1 Turbine Option 2 **Comprehensive Project**	Bald eagles are estimated to be the 17th most likely large bird to collide with the turbines, with an estimated exposure index of 0.01. Further, turbines could create barriers to bald eagle movement over the Lease Boundary.	Low	Long Term	Feasible	Confined	**Wild-1**: Review 2-year raptor and bat monitoring program. **Wild-2**: Use wildlife-proof trash containers. **Wild-3**: Review USFWS eagle mortality consultation. **Wild-4**: Avoid use of pesticides and rodenticides. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Spec-3:** Implement eagle specific mitigation.	None identified

Table 4.6-11b: Summary of Potential Impacts on Wildlife and Habitat during Operation of the Proposed Project

Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact: • Negligible • Low • Medium • High	Duration of Impact: • Temporary • Short Term • Long Term • Constant	Likelihood of Impact: • Unlikely • Feasible • Probable • Unavoidable	Spatial Extent or Setting of Impact: • Limited • Confined • Local • Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Special status species: bald eagle	Solar Arrays BESSs Substations	Solar arrays, BESSs, substations, and other ground-based disturbances could reduce foraging habitat for bald eagles, though the Lease Boundary is not expected to provide key or important bald eagle habitat.	Negligible	Long Term	Unavoidable	Confined	**Wild-2**: Use wildlife-proof trash containers. **Wild-3**: Review USFWS eagle mortality consultation. **Wild-4**: Avoid use of pesticides and rodenticides. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Spec-3:** Implement eagle specific mitigation.	None identified
Special status species: burrowing owl	Turbine Option 1 Turbine Option 2 **Comprehensive Project**	Permanent habitat loss from turbine footprint and roads would persist through operation. Operation of turbines could result in indirect burrowing owl habitat loss. Burrowing owls are not expected to collide with turbines,but are susceptible to road-based mortality. Further, changes in prey distribution and abundance may change foraging.	Medium	Constant	Unavoidable	Confined	**Wild-4**: Avoid use of pesticides and rodenticides. **Wild-6**: Maintain database of road mortalities. **Wild-8**: Establish buffers around raptor nests. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation **Spec-4**: Implement burrowing owl specific mitigation.	None identified
Special status species: burrowing owl	Solar Arrays BESSs Substations	Areas under solar arrays may continue to provide habitat for burrowing owls, depending on conditions under the arrays. Habitat altered by the BESSs and substations would be lost throughout operation. Increased traffic on roads used to access solar arrays, BESSs, and substructures may result in burrowing owl mortality.	Medium	Constant	Feasible	Confined	**Wild-4**: Avoid use of pesticides and rodenticides. **Wild-6**: Maintain database of road mortalities. **Wild-8**: Establish buffers around raptor nests. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation. **Spec-4**: Implement burrowing owl specific mitigation.	None identified

Table 4.6-11b: Summary of Potential Impacts on Wildlife and Habitat during Operation of the Proposed Project

Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact: • Negligible • Low • Medium • High	Duration of Impact: • Temporary • Short Term • Long Term • Constant	Likelihood of Impact: • Unlikely • Feasible • Probable • Unavoidable	Spatial Extent or Setting of Impact: • Limited • Confined • Local • Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Special status species: ferruginous hawk	Turbine Option 1 Turbine Option 2 **Comprehensive Project**	Operation of the turbines could result in mortality due to collisions with turbines and power lines. Change in prey abundance may reduce hawk survivorship. Operation may also reduce the re-occupancy of nesting territories due to disturbance.	High	Constant	Feasible	Confined	**Wild-1**: Review 2-year raptor and bat monitoring program. **Wild-4**: Avoid use of pesticides and rodenticides. **Wild-6**: Maintain database of road mortalities. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation. **Spec-5**: Implement ferruginous hawk specific mitigation.	None identified
Special status species: ferruginous hawk	Solar arrays	Solar arrays may change prey structures, resulting in impacts on adult and young survivorship.	Medium	Constant	Feasible	Confined	**Wild-1**: Review 2-year raptor and bat monitoring program. **Wild-4**: Avoid use of pesticides and rodenticides. **Wild-6**: Maintain database of road mortalities. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation. **Spec-5**: Implement ferruginous hawk specific mitigation.	None identified

Table 4.6-11b: Summary of Potential Impacts on Wildlife and Habitat during Operation of the Proposed Project

Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact: • Negligible • Low • Medium • High	Duration of Impact: • Temporary • Short Term • Long Term • Constant	Likelihood of Impact: • Unlikely • Feasible • Probable • Unavoidable	Spatial Extent or Setting of Impact: • Limited • Confined • Local • Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Special status species: ferruginous hawk	BESSs Substations	Operation of the BESSs and substations may result in loss of potential foraging habitat for ferruginous hawk.	Negligible	Constant	Unavoidable	Limited	**Wild-1**: Review 2-year raptor and bat monitoring program. **Wild-4**: Avoid use of pesticides and rodenticides. **Wild-6**: Maintain database of road mortalities. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation. **Spec-5**: Implement ferruginous hawk specific mitigation.	None identified
Special status species: golden eagle	Turbine Option 1 Turbine Option 2 **Comprehensive Project**	Golden eagles are estimated to be the 22nd most likely large bird to collide with the turbines. Further, turbines could create barriers to golden eagle movement over the Lease Boundary.	Medium	Long Term	Feasible	Confined	**Wild-1**: Review 2-year raptor and bat monitoring program. **Wild-2**: Use wildlife-proof trash containers. **Wild-3**: Review USFWS eagle mortality consultation. **Wild-4**: Avoid use of pesticides and rodenticides. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Spec-3:** Implement eagle specific mitigation.	None identified
Special status species: golden eagle	Solar Arrays BESSs Substations	Solar arrays, BESSs, substations, and other ground-based disturbances could reduce foraging habitat for golden eagles, though the Lease Boundary is not expected to provide key or important golden eagle habitat.	Negligible	Long Term	Unavoidable	Confined	**Wild-2**: Use wildlife-proof trash containers. **Wild-3**: Review USFWS eagle mortality consultation. **Wild-4**: Avoid use of pesticides and rodenticides. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Spec-3:** Implement eagle specific mitigation.	None identified

Table 4.6-11b: Summary of Potential Impacts on Wildlife and Habitat during Operation of the Proposed Project

Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact: • Negligible • Low • Medium • High	Duration of Impact: • Temporary • Short Term • Long Term • Constant	Likelihood of Impact: • Unlikely • Feasible • Probable • Unavoidable	Spatial Extent or Setting of Impact: • Limited • Confined • Local • Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Special status species: great blue heron and sandhill crane	Turbine Option 1 Turbine Option 2 **Comprehensive Project**	The operation of wind turbines may result in great blue heron and sandhill crane mortality and disturbance.	Medium	Long Term	Feasible	Confined	**Wild-1**: Review 2-year raptor and bat monitoring program. **Wild-4**: Avoid use of pesticides and rodenticides. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Spec-6**: Implement great blue heron, sandhill crane, and tundra swan specific mitigation.	None identified
Special status species: great blue heron and sandhill crane	Solar Arrays BESSs Substations	Habitat loss during construction to accommodate the solar arrays, BESSs, and substations would continue through operation.	Negligible	Long Term	Unavoidable	Confined	**Wild-1**: Review 2-year raptor and bat monitoring program. **Wild-4**: Avoid use of pesticides and rodenticides. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Spec-6**: Implement great blue heron, sandhill crane, and tundra swan specific mitigation.	None identified
Special status species: loggerhead shrike	Turbine Option 1 Turbine Option 2 **Comprehensive Project**	Direct and indirect habitat loss would persist throughout Project operation. Loggerhead shrike mortality may occur due to strikes with turbines.	Medium	Constant	Unavoidable	Confined	**Wild-4**: Avoid use of pesticides and rodenticides. **Wild-6**: Maintain database of road mortalities. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation. **Spec-7:** Implement loggerhead shrike, sagebrush sparrow, sage thrasher, and Vaux's swift specific mitigation.	None identified

Table 4.6-11b: Summary of Potential Impacts on Wildlife and Habitat during Operation of the Proposed Project

Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact: • Negligible • Low • Medium • High	Duration of Impact: • Temporary • Short Term • Long Term • Constant	Likelihood of Impact: • Unlikely • Feasible • Probable • Unavoidable	Spatial Extent or Setting of Impact: • Limited • Confined • Local • Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Special status species: loggerhead shrike	Solar Arrays	Direct and indirect habitat loss would persist throughout Project operation.	Low	Constant	Unavoidable	Confined	**Wild-4**: Avoid use of pesticides and rodenticides. **Wild-6**: Maintain database of road mortalities. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation. **Spec-7:** Implement loggerhead shrike, sagebrush sparrow, sage thrasher, and Vaux's swift specific mitigation.	None identified
Special status species: loggerhead shrike	BESSs Substations	Direct and indirect habitat loss would persist throughout Project operation.	Negligible	Constant	Unavoidable	Confined	**Wild-4**: Avoid use of pesticides and rodenticides. **Wild-6**: Maintain database of road mortalities. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design **Veg-4:** As-built report and offset calculation. **Spec-7:** Implement loggerhead shrike, sagebrush sparrow, sage thrasher, and Vaux's swift specific mitigation.	None identified

Table 4.6-11b: Summary of Potential Impacts on Wildlife and Habitat during Operation of the Proposed Project

Topic	Component(a)	Description of Impact(b)	Magnitude of Impact: • Negligible • Low • Medium • High	Duration of Impact: • Temporary • Short Term • Long Term • Constant	Likelihood of Impact: • Unlikely • Feasible • Probable • Unavoidable	Spatial Extent or Setting of Impact: • Limited • Confined • Local • Regional	Mitigation(c)	Significant Unavoidable Adverse Impacts(d)
Special status species: prairie falcon	Turbine Option 1 Turbine Option 2 **Comprehensive Projec**t	Direct habitat loss would persist throughout Project operation. Operation of the turbines may disturb prairie falcons foraging in the Lease Boundary. Operation of the turbines may result in mortality of prairie falcons. Changes in prey density may change habitat suitability and survivorship of prairie falcons.	Medium	Constant	Unavoidable	Confined	**Wild-1**: Review 2-year raptor and bat monitoring program **Wild-4**: Avoid use of pesticides and rodenticides. **Wild-6**: Maintain database of road mortalities. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation. **Spec-8**: Implement prairie falcon specific mitigation.	None identified
Special status species: prairie falcon	Solar Arrays	Solar arrays may change prey dynamics in the Lease Boundary (e.g., sheltering under arrays), thereby reducing habitat suitability and survivorship of prairie falcons.	Low	Constant	Feasible	Confined	**Wild-4**: Avoid use of pesticides and rodenticides. **Wild-6**: Maintain database of road mortalities. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation **Spec-8**: Implement prairie falcon specific mitigation.	None identified

Table 4.6-11b: Summary of Potential Impacts on Wildlife and Habitat during Operation of the Proposed Project

Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact: • Negligible • Low • Medium • High	Duration of Impact: • Temporary • Short Term • Long Term • Constant	Likelihood of Impact: • Unlikely • Feasible • Probable • Unavoidable	Spatial Extent or Setting of Impact: • Limited • Confined • Local • Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Special status species: prairie falcon	BESSs Substations	Direct habitat loss at the BESSs and substations would persist throughout operation.	Negligible	Constant	Unavoidable	Limited	**Wild-4**: Avoid use of pesticides and rodenticides. **Wild-6**: Maintain database of road mortalities. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation. **Spec-8**: Implement prairie falcon specific mitigation.	None identified
Special status species: ring-necked pheasant	Turbine Option 1 Turbine Option 2 **Comprehensive Project**	Direct habitat loss would persist through Operation. Operation of the turbines may also result in indirect habitat loss. Ring-necked pheasant mortality may occur due to Project operation. Access roads may result in collisions with ring-necked pheasants.	Low	Long Term	Unavoidable	Confined	**Wild-6**: Maintain database of road mortalities **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Spec-9**: Implement ring-necked pheasant specific mitigation.	None identified
Special status species: ring-necked pheasant	Solar arrays BESSs Substations	Direct habitat loss would persist throughout operation. Access roads may result in collisions with ring-necked pheasants.	Negligible	Long Term	Unavoidable	Confined	**Wild-6**: Maintain database of road mortalities **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Spec-9**: Implement ring-necked pheasant specific mitigation.	None identified
Special status species: sagebrush sparrow and sage thrasher	Turbine Option 1 Turbine Option 2 Solar Arrays **Comprehensive Project**	Direct and indirect habitat loss would persist throughout Project operation.	Medium	Constant	Unavoidable	Confined	**Wild-4**: Avoid use of pesticides and rodenticides. **Wild-6**: Maintain database of road mortalities. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation. **Spec-7:** Implement loggerhead shrike, sagebrush sparrow, sage thrasher, and Vaux's swift specific mitigation.	None identified

Table 4.6-11b: Summary of Potential Impacts on Wildlife and Habitat during Operation of the Proposed Project

Topic	Component[a]	Description of Impact[b]	Magnitude of Impact: • Negligible • Low • Medium • High	Duration of Impact: • Temporary • Short Term • Long Term • Constant	Likelihood of Impact: • Unlikely • Feasible • Probable • Unavoidable	Spatial Extent or Setting of Impact: • Limited • Confined • Local • Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Special status species: sagebrush sparrow and sage thrasher	BESSs Substations	Direct and indirect habitat loss would persist throughout Project operation.	Negligible	Long Term	Unavoidable	Confined	**Wild-4**: Avoid use of pesticides and rodenticides. **Wild-6**: Maintain database of road mortalities. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation. **Spec-7:** Implement loggerhead shrike, sagebrush sparrow, sage thrasher, and Vaux's swift specific mitigation.	None identified
Special status species: tundra swan	Turbine Option 1 **Comprehensive Project**	Operation of turbines may result in the continued loss and disturbance of foraging habitat. Operation of Option 1 may result in tundra swan mortality through collision with turbines.	Low	Long Term	Feasible	Confined	**Wild-1**: Review 2-year raptor and bat monitoring program. **Wild-4**: Avoid use of pesticides and rodenticides. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Veg-4:** As-built report and offset calculation. **Spec-6**: Implement great blue heron, sandhill crane, and tundra swan specific mitigation.	None identified
Special status species: tundra swan	Turbine Option 2	Operation of turbines may result in the continued loss and disturbance of foraging habitat. Turbine Option 2 is predicted to have an exposure index of 0.	Negligible	Long Term	Feasible	Confined	**Wild-1**: Review 2-year raptor and bat monitoring program. **Wild-4**: Avoid use of pesticides and rodenticides. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Spec-6**: Implement great blue heron, sandhill crane, and tundra swan specific mitigation.	None identified

Table 4.6-11b: Summary of Potential Impacts on Wildlife and Habitat during Operation of the Proposed Project

Topic	Component[a]	Description of Impact[b]	Magnitude of Impact: • Negligible • Low • Medium • High	Duration of Impact: • Temporary • Short Term • Long Term • Constant	Likelihood of Impact: • Unlikely • Feasible • Probable • Unavoidable	Spatial Extent or Setting of Impact: • Limited • Confined • Local • Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Special status species: tundra swan	Solar Arrays	Operation of the solar array may result in continued loss of foraging habitat. Tundra swans may be killed if attempting to land on solar arrays.	Low	Long Term	Feasible	Confined	**Wild-1**: Review 2-year raptor and bat monitoring program. **Wild-4**: Avoid use of pesticides and rodenticides. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Spec-6**: Implement great blue heron, sandhill crane, and tundra swan specific mitigation.	None identified
Special status species: tundra swan	BESSs Substations	Operation of the BESSs and substations may result in continued loss of foraging habitat.	Negligible	Long Term	Unavoidable	Limited	**Wild-1**: Review 2-year raptor and bat monitoring program. **Wild-4**: Avoid use of pesticides and rodenticides. **Hab-1:** Avoid corridors. **Hab-2:** Minimize transmission line crossings. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Spec-6**: Implement great blue heron, sandhill crane, and tundra swan specific mitigation.	None identified
Special status species: Vaux's swift	Turbine Option 1 Turbine Option 2 **Comprehensive Project**	Vaux's swift migrating over the Lease Boundary are susceptible to strikes during migration.	Low	Long Term	Feasible	Confined	**Wild-4**: Avoid use of pesticides and rodenticides. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Spec-7:** Implement loggerhead shrike, sagebrush sparrow, sage thrasher, and Vaux's swift specific mitigation.	None identified
Special status species: Vaux's swift	Solar Arrays BESSs Substations	No effects on Vaux's swift from these facilities are expected.	Negligible	Long Term	Unlikely	Confined	**Wild-4**: Avoid use of pesticides and rodenticides. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Spec-7:** Implement loggerhead shrike, sagebrush sparrow, sage thrasher, and Vaux's swift specific mitigation.	None identified

Table 4.6-11b: Summary of Potential Impacts on Wildlife and Habitat during Operation of the Proposed Project

Topic	Component[a]	Description of Impact[b]	Magnitude of Impact: • Negligible • Low • Medium • High	Duration of Impact: • Temporary • Short Term • Long Term • Constant	Likelihood of Impact: • Unlikely • Feasible • Probable • Unavoidable	Spatial Extent or Setting of Impact: • Limited • Confined • Local • Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Special status species: black-tailed jackrabbit and white-tailed jackrabbit	Turbine Option 1 Turbine Option 2 **Comprehensive Project**	Operation of the turbines may result in indirect loss of jackrabbit habitat and mortality along access roads. Direct habitat loss is expected to persist throughout operation.	Medium	Constant	Unavoidable	Confined	**Wild-4**: Avoid use of pesticides and rodenticides **Wild-6**: Maintain database of road mortalities **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation **Spec-10:** Implement black and white-tailed jackrabbit specific mitigation.	None identified
Special status species: black-tailed jackrabbit and white-tailed jackrabbit	Solar arrays	Solar arrays could provide shelter for jackrabbits reducing predation. Mortality may along access roads may occur.	Low	Constant	Feasible	Confined	**Wild-4**: Avoid use of pesticides and rodenticides **Wild-6**: Maintain database of road mortalities **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation. **Spec-10:** Implement black and white-tailed jackrabbit specific mitigation.	None identified
Special status species: black-tailed jackrabbit and white-tailed jackrabbit	BESSs Substations	Operation of the turbines may result in direct loss of jackrabbit habitat and mortality along access roads.	Negligible	Long Term	Unavoidable	Limited	**Wild-4**: Avoid use of pesticides and rodenticides **Wild-6**: Maintain database of road mortalities **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation. **Spec-10:** Implement black and white-tailed jackrabbit specific mitigation.	None identified

Table 4.6-11b: Summary of Potential Impacts on Wildlife and Habitat during Operation of the Proposed Project

Topic	Component[a]	Description of Impact[b]	Magnitude of Impact: • Negligible • Low • Medium • High	Duration of Impact: • Temporary • Short Term • Long Term • Constant	Likelihood of Impact: • Unlikely • Feasible • Probable • Unavoidable	Spatial Extent or Setting of Impact: • Limited • Confined • Local • Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Special status species: Townsend's big-eared bat	Turbine Option 1 Turbine Option 2 **Comprehensive Project**	Townsend's big-eared bat mortality may occur due to Project operation. Operation may result in indirect loss of foraging habitat.	Low	Long Term	Probable	Confined	**Wild-1**: Review 2-year raptor and bat monitoring program **Wild-4:** Avoid use of pesticides and rodenticides **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Spec-11:** Implement Townsend's big-eared bat specific mitigation.	None identified
Special status species: Townsend's big-eared bat	Solar Arrays	Townsend's big-eared bat may collide with solar arrays during operation.	Low	Long Term	Unlikely	Confined	**Wild-4**: Avoid use of pesticides and rodenticides. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Spec-11:** Implement Townsend's big-eared bat specific mitigation.	None identified
Special status species: Townsend's big-eared bat	BESSs Substations	Interaction with BESSs and substations are not predicted.	Negligible	Long Term	Unlikely	Limited	**Wild-4**: Avoid use of pesticides and rodenticides. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Spec-11:** Implement Townsend's big-eared bat specific mitigation.	None identified
Special status species: Townsend's ground squirrel	Turbine Option 1 Turbine Option 2 Solar Arrays **Comprehensive Project**	Townsend's ground squirrel mortality may continue along access roads during operation. Operation of the solar arrays may alter Townsend's ground squirrel behavior by providing shelter. Mortality may occur along access roads.	Medium	Constant	Feasible	Confined	**Wild-4:** Avoid use of pesticides and rodenticides **Wild-6:** Maintain database of road mortalities **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation. **Spec-12:** Implement Townsend's ground squirrel specific mitigation.	None identified

Table 4.6-11b: Summary of Potential Impacts on Wildlife and Habitat during Operation of the Proposed Project

Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact: • Negligible • Low • Medium • High	Duration of Impact: • Temporary • Short Term • Long Term • Constant	Likelihood of Impact: • Unlikely • Feasible • Probable • Unavoidable	Spatial Extent or Setting of Impact: • Limited • Confined • Local • Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Special status species: Townsend's ground squirrel	BESSs Substations	Direct habitat loss would persist through operation. Mortality may occur along access roads during operation of BESSs and substations.	Negligible	Constant	Feasible	Limited	**Wild-4:** Avoid use of pesticides and rodenticides. **Wild-6:** Maintain database of road mortalities. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation. **Spec-12:** Implement Townsend's ground squirrel specific mitigation.	None identified
Special status species: pronghorn antelope	Turbine Option 1 Turbine Option 2 **Comprehensive Project**	Operation of the Project may result in direct and indirect habitat loss to pronghorn antelope. Pronghorn antelope mortality may occur along maintenance roads.	Medium	Constant	Unavoidable	Confined	**Wild-6**: Maintain database of road mortalities. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation. **Spec-13:** Implement pronghorn antelope specific mitigation.	None identified
Special status species: pronghorn antelope	Solar Arrays	Pronghorn antelope would be precluded from solar arrays during operation due to fencing. Pronghorn antelope mortality may occur along maintenance roads.	Medium	Constant	Unavoidable	Confined	**Wild-6**: Maintain database of road mortalities. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation. **Spec-13:** Implement pronghorn antelope specific mitigation.	None identified

Table 4.6-11b: Summary of Potential Impacts on Wildlife and Habitat during Operation of the Proposed Project

Topic	Component[a]	Description of Impact[b]	Magnitude of Impact: • Negligible • Low • Medium • High	Duration of Impact: • Temporary • Short Term • Long Term • Constant	Likelihood of Impact: • Unlikely • Feasible • Probable • Unavoidable	Spatial Extent or Setting of Impact: • Limited • Confined • Local • Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Special status species: pronghorn antelope	BESSs Substations	Pronghorn antelope would be precluded from BESSs and substations. Pronghorn antelope mortality may occur along maintenance roads.	Negligible	Long Term	Unavoidable	Limited	**Wild-6**: Maintain database of road mortalities. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-6:** Work with EFSEC on final Project layout and design. **Veg-4:** As-built report and offset calculation. **Spec-13:** Implement pronghorn antelope specific mitigation.	None identified

Notes:
[a] The impacts related to each component including “comprehensive Project” were rated separately; components were combined in the same cell if they received the same impact ratings for the identified topic.
[b] Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.
[c] Mitigation measures listed here are additional actions that EFSEC could impose to further reduce the impacts. See Section 4.1 for details.
[d] Significant unavoidable impacts are those that would remain even after all identified additional mitigation measures have been required by EFSEC.
BESS = battery energy storage system; EFSEC = Washington Energy Facility Siting Evaluation Council; EFSEC = Washington Energy Facility Site Evaluation Council; NA = not applicable; TAC = Technical Advisory Committee; ZOI = zone of influence

Table 4.6-11c: Summary of Potential Impacts on Wildlife and Habitat during Decommissioning of the Proposed Project

Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact: • Negligible • Low • Medium • High	Duration of Impact: • Temporary • Short Term • Long Term • Constant	Likelihood of Impact: • Unlikely • Feasible • Probable • Unavoidable	Spatial Extent or Setting of Impact: • Limited • Confined • Local • Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Habitat loss	Turbine Option 1 Turbine Option 2 **Comprehensive Project**	The Project would result in temporary loss of habitat during decommissioning. No new permanent habitat loss is expected, and restoration activities are expected to replace and/or enhance habitat loss created during construction and operation.	Negligible	Short Term	Unavoidable	Local	**Wild-5:** Limit construction disturbance by identifying sensitive areas. **Hab-7:** Roadway decommissioning. **Veg-1:** Tree Avoidance. **Veg-7:** Detailed Site Restoration Plan.	None identified
Habitat loss	Solar Arrays	The Project would result in temporary loss of habitat during decommissioning. No new permanent habitat loss is expected, and restoration activities are expected to replace and/or enhance habitat loss created during construction and operation.	Negligible	Short Term	Unavoidable	Confined	**Wild-5:** Limit construction disturbance by identifying sensitive areas. **Hab-7:** Roadway decommissioning. **Veg-1:** Tree Avoidance. **Veg-7:** Detailed Site Restoration Plan.	None identified
Habitat loss	BESSs Substations	The Project would result in temporary loss of habitat during decommissioning. No new permanent habitat loss is expected, and restoration activities are expected to replace and/or enhance habitat loss created during construction and operation.	Negligible	Short Term	Unavoidable	Limited	**Wild-5:** Limit construction disturbance by identifying sensitive areas. **Hab-7:** Roadway decommissioning. **Veg-1:** Tree Avoidance. **Veg-7:** Detailed Site Restoration Plan.	None identified
Mortality of non-special status species	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Sources of wildlife injuries and mortalities during decommissioning include collisions with equipment; removal of nuisance wildlife; destruction of nests, dens, and burrows; and habitat loss. The risk of mortalities would be limited to the duration of decommissioning.	Negligible	Short Term	Feasible	Confined	**Wild-1**: Review 2-year raptor and bat monitoring program. **Wild-2**: Use wildlife-proof trash containers. **Wild-3**: Review USFWS eagle mortality consultation. **Wild-4**: Avoid use of pesticides and rodenticides. **Wild-5:** Limit activity disturbance by identifying sensitive areas. **Wild-6**: Maintain database of road mortalities. **Wild-7:** Schedule activities during daylight hours. **Wild-8**: Establish buffers around raptor nests.	None identified
Barriers to movement and fragmentation	Turbine Option 1 Turbine Option 2 Solar arrays **Comprehensive Project**	Decommissioning would remove Project-related barriers to movement and reduce habitat fragmentation by removing infrastructure and revegetating disturbed areas.	Negligible	Short Term	Feasible	Confined	**Wild-5:** Limit activity disturbance by identifying sensitive areas. **Hab-7:** Roadway decommissioning. **Veg-7:** Detailed Site Restoration Plan.	None identified

Table 4.6-11c: Summary of Potential Impacts on Wildlife and Habitat during Decommissioning of the Proposed Project

Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact: • Negligible • Low • Medium • High	Duration of Impact: • Temporary • Short Term • Long Term • Constant	Likelihood of Impact: • Unlikely • Feasible • Probable • Unavoidable	Spatial Extent or Setting of Impact: • Limited • Confined • Local • Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Barriers to movement and fragmentation	BESSs Substations	Decommissioning would remove Project-related barriers to movement and reduce habitat fragmentation by removing infrastructure and revegetating disturbed areas.	Negligible	Short Term	Feasible	Limited	**Wild-5:** Limit activity disturbance by identifying sensitive areas. **Hab-7:** Roadway decommissioning **Veg-7:** Detailed Site Restoration Plan**.**	None identified
Special status species: striped whipsnake and sagebrush lizard	Turbine Option 1 Turbine Option 2 Solar Array BESSs Substations **Comprehensive Project**	Ground disturbance and machinery use during Project decommissioning could result in mortality of striped whipsnake and sagebrush lizard.	Negligible	Short Term	Feasible	Confined	**Wild-5:** Limit construction disturbance by identifying sensitive areas. **Wild-6**: Maintain database of road mortalities. **Hab-4:** Develop TAC. **Hab-7:** Roadway decommissioning **Veg-7:** Detailed Site Restoration Plan. **Spec-1:** Implement striped whipsnake and sagebrush lizard specific mitigation.	None identified
Special status species: American white pelican	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Decommissioning of the Project may disturb American white pelicans moving over the Lease Boundary.	Negligible	Short Term	Unlikely	Confined	**Hab-4:** Develop TAC. **Spec-2**: Implement American white pelican specific mitigation.	None identified
Special status species: bald eagle	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Decommissioning of the Project could disturb bald eagles, resulting in avoidance of the Project site.	Negligible	Short Term	Feasible	Confined	**Wild-2**: Use wildlife-proof trash containers. **Wild-3**: Review USFWS eagle mortality consultation. **Wild-4**: Avoid use of pesticides and rodenticides. **Wild-5:** Limit construction disturbance by identifying sensitive areas. **Veg-1:** Tree Avoidance. **Hab-4:** Develop TAC. **Spec-3:** Implement eagle specific mitigation.	None identified

Table 4.6-11c: Summary of Potential Impacts on Wildlife and Habitat during Decommissioning of the Proposed Project

Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact: • Negligible • Low • Medium • High	Duration of Impact: • Temporary • Short Term • Long Term • Constant	Likelihood of Impact: • Unlikely • Feasible • Probable • Unavoidable	Spatial Extent or Setting of Impact: • Limited • Confined • Local • Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Special status species: burrowing owl	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Decommissioning may result in mortality from machinery operation over the Lease Boundary.	Negligible	Short Term	Unlikely	Confined	**Wild-1**: Review 2-year raptor and bat monitoring program. **Wild-4**: Avoid use of pesticides and rodenticides. **Wild-5:** Limit construction disturbance by identifying sensitive areas. **Wild-6**: Maintain database of road mortalities. **Wild-7:** Schedule activity to daylight hours. **Wild-8**: Establish buffers around raptor nests. **Hab-4:** Develop TAC. **Hab-7:** Roadway decommissioning. **Veg-7:** Detailed Site Restoration Plan. **Spec-4**: Implement burrowing owl specific mitigation.	None identified
Special status species: ferruginous hawk	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Decommissioning may result in mortality from machinery operation over the Lease Boundary.	Negligible	Short Term	Feasible	Confined	**Wild-1**: Review 2-year raptor and bat monitoring program. **Wild-4**: Avoid use of pesticides and rodenticides. **Wild-5:** Limit disturbance by identifying sensitive areas. **Wild-6**: Maintain database of road mortalities. **Wild-8**: Establish buffers around raptor nests. **Hab-4:** Develop TAC. **Hab-7:** Roadway decommissioning. **Veg-7:** Detailed Site Restoration Plan. **Spec-5**: Ferruginous hawk specific mitigation	None identified

Table 4.6-11c: Summary of Potential Impacts on Wildlife and Habitat during Decommissioning of the Proposed Project

Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact: • Negligible • Low • Medium • High	Duration of Impact: • Temporary • Short Term • Long Term • Constant	Likelihood of Impact: • Unlikely • Feasible • Probable • Unavoidable	Spatial Extent or Setting of Impact: • Limited • Confined • Local • Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Special status species: golden eagle	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Decommissioning of the Project could disturb golden eagles, resulting in avoidance of the Project site, though golden eagle nesting has not been reported within 10 miles of the Lease Boundary.	Negligible	Short Term	Unlikely	Confined	**Wild-2**: Use wildlife-proof trash containers. **Wild-3**: Review USFWS eagle mortality consultation. **Wild-4**: Avoid use of pesticides and rodenticides. **Wild-5**: Limit construction disturbance by identifying sensitive areas. **Veg-1:** Tree Avoidance. **Hab-4:** Develop TAC. **Spec-3:** Implement eagle specific mitigation.	None identified
Special status species: great blue heron and sandhill crane	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Decommissioning activities may disturb birds flying over the Lease Boundary, resulting in bird flight paths being diverted around the area.	Negligible	Short Term	Feasible	Confined	**Wild-1**: Review 2-year raptor and bat monitoring program. **Wild-4**: Avoid use of pesticides and rodenticides. **Wild-5:** Limit disturbance by identifying sensitive areas. **Hab-4:** Develop TAC. **Spec-6**: Implement great blue heron, sandhill crane, and tundra swan specific mitigation.	None identified
Special status species: loggerhead shrike	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Decommissioning may disturb birds foraging and nesting in the Lease Boundary. Machinery could result in mortality of birds and destruction of nests.	Negligible	Short Term	Feasible	Confined	**Wild-4**: Avoid use of pesticides and rodenticides. **Wild-5:** Limit disturbance by identifying sensitive areas. **Wild-6**: Maintain database of road mortalities. **Wild-7:** schedule activities to daylight hours. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-7:** Roadway decommissioning. **Veg-7:** Detailed Site Restoration Plan. **Spec-7:** Implement loggerhead shrike, sagebrush sparrow, sage thrasher, and Vaux's swift specific mitigation.	None identified

Table 4.6-11c: Summary of Potential Impacts on Wildlife and Habitat during Decommissioning of the Proposed Project

Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact: • Negligible • Low • Medium • High	Duration of Impact: • Temporary • Short Term • Long Term • Constant	Likelihood of Impact: • Unlikely • Feasible • Probable • Unavoidable	Spatial Extent or Setting of Impact: • Limited • Confined • Local • Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Special status species: prairie falcon	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Disturbance from decommissioning activities may result in disturbance to prairie falcons.	Negligible	Short Term	Unlikely	Confined	**Wild-4**: Avoid use of pesticides and rodenticides. **Wild-5:** Limit disturbance by identifying sensitive areas. **Wild-6**: Maintain database of road mortalities. **Wild-8**: Establish buffers around raptor nests. **Veg-1:** Tree Avoidance. **Hab-4:** Develop TAC. **Hab-7:** Roadway decommissioning. **Veg-7:** Detailed Site Restoration Plan. **Spec-8**: Implement prairie falcon specific mitigation.	None identified
Special status species: ring-necked pheasant	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Disturbance from decommissioning activities may result in indirect habitat loss. Access roads may result in collisions with ring-necked pheasants.	Negligible	Short Term	Feasible	Confined	**Wild-5:** Limit disturbance by identifying sensitive areas. **Wild-6**: Maintain database of road mortalities. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-7:** Roadway decommissioning **Veg-7:** Detailed Site Restoration Plan. **Spec-9**: Implement ring-necked pheasant specific mitigation.	None identified
Special status species: sagebrush sparrow and sage thrasher	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Decommissioning may disturb birds foraging and nesting in the Lease Boundary. Machinery could result in mortality of birds and destruction of nests.	Negligible	Short Term	Feasible	Confined	**Wild-4**: Avoid use of pesticides and rodenticides. **Wild-5:** Limit disturbance by identifying sensitive areas. **Wild-6**: Maintain database of road mortalities. **Wild-7:** schedule activities to daylight hours **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-7:** Roadway decommissioning. **Veg-7:** Detailed Site Restoration Plan. **Spec-7:** Implement loggerhead shrike, sagebrush sparrow, sage thrasher, and Vaux's swift specific mitigation.	None identified

Table 4.6-11c: Summary of Potential Impacts on Wildlife and Habitat during Decommissioning of the Proposed Project

Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact: • Negligible • Low • Medium • High	Duration of Impact: • Temporary • Short Term • Long Term • Constant	Likelihood of Impact: • Unlikely • Feasible • Probable • Unavoidable	Spatial Extent or Setting of Impact: • Limited • Confined • Local • Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Special status species: tundra swan	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Decommissioning may disturb tundra swans flying over and foraging in the Lease Boundary.	Negligible	Short Term	Feasible	Confined	**Wild-1**: Review 2-year raptor and bat monitoring program. **Wild-4**: Avoid use of pesticides and rodenticides. **Wild-5:** Limit disturbance by identifying sensitive areas. **Hab-4:** Develop TAC. **Spec-6**: Implement great blue heron, sandhill crane, and tundra swan specific mitigation.	None identified
Special status species: Vaux's swift	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Decommissioning of the Project could disturb Vaux's swifts in flight over the Lease Boundary.	Negligible	Short Term	Unlikely	Confined	**Wild-4**: Avoid use of pesticides and rodenticides. **Hab-4:** Develop TAC. **Spec-7:** Implement loggerhead shrike, sagebrush sparrow, sage thrasher, and Vaux's swift specific mitigation.	None identified
Special status species: black-tailed jackrabbit and white-tailed jackrabbit	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Disturbance from decommissioning activities may result in indirect habitat loss. Access roads may result in collisions with jackrabbits.	Negligible	Short Term	Feasible	Confined	**Wild-4**: Avoid use of pesticides and rodenticides. **Wild-5:** Limit disturbance by identifying sensitive areas **Wild-6**: Maintain database of road mortalities. **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-7:** Roadway decommissioning **Veg-7:** Detailed Site Restoration Plan. **Spec-10:** Implement black and white-tailed jackrabbit specific mitigation.	None identified
Special status species: Townsend's big-eared bat	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Decommissioning activities could disturb Townsend's big-eared bat foraging in the Lease Boundary.	Negligible	Short Term	Unlikely	Confined	**Wild-4**: Avoid use of pesticides and rodenticides. **Wild-7:** schedule construction during daylight hours **Hab-4:** Develop TAC. **Spec-11:** Implement Townsend's big-eared bat specific mitigation.	None identified

Table 4.6-11c: Summary of Potential Impacts on Wildlife and Habitat during Decommissioning of the Proposed Project

Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact: • Negligible • Low • Medium • High	Duration of Impact: • Temporary • Short Term • Long Term • Constant	Likelihood of Impact: • Unlikely • Feasible • Probable • Unavoidable	Spatial Extent or Setting of Impact: • Limited • Confined • Local • Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Special status species: Townsend's ground squirrel	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Mortality may occur during decommissioning and along access roads.	Negligible	Short Term	Feasible	Confined	**Wild-4**: Avoid use of pesticides and rodenticides. **Wild-5:** Limit disturbance by identifying sensitive areas **Wild-6**: Maintain database of road mortalities **Hab-4:** Develop TAC. **Hab-7:** Roadway decommissioning. **Veg-7:** Detailed Site Restoration Plan. **Spec-12:** Implement Townsend's ground squirrel specific mitigation.	None identified
Special status species: pronghorn antelope	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Decommissioning is predicted to result in indirect habitat loss. Increased traffic on existing and new access roads may result in pronghorn antelope mortality.	Negligible	Short Term	Feasible	Confined	**Wild-5:** Limit disturbance by identifying sensitive areas. **Wild-6**: Maintain database of road mortalities **Hab-4:** Develop TAC. **Hab-5:** Manage ZOI. **Hab-7:** Roadway decommissioning. **Veg-7:** Detailed Site Restoration Plan. **Spec-13:** Implement pronghorn antelope specific mitigation.	None identified

Notes:
(a) The impacts related to each component including "comprehensive Project" were rated separately; components were combined in the same cell if they received the same impact ratings for the identified topic.
(b) Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.
(c) Mitigation measures listed here are additional actions that EFSEC could impose to further reduce the impacts. See Section 4.1 for details.
(d) Significant unavoidable impacts are those that would remain even after all identified additional mitigation measures have been required by EFSEC.
BESS = battery energy storage system; EFSEC = Washington Energy Facility Siting Evaluation Council; EFSEC = Washington Energy Facility Site Evaluation Council; NA = not applicable; TAC = Technical Advisory Committee; ZOI = zone of influence

4.6.3 Impacts of No Action Alternative

Under the No Action Alternative, impacts related to wildlife and habitat from the construction, operation, and decommissioning of the Proposed Action would not occur. For the purpose of this analysis, it is assumed that no future development would occur within the Lease Boundary.

This Page Intentionally Left Blank

4.7 Energy and Natural Resources

This section evaluates the impacts of the proposed Horse Heaven Wind Farm (Project, or Proposed Action) on the availability of energy and natural resources within the Project vicinity and in the State of Washington. Section 3.7 presents the affected environment for energy and natural resources. The Project vicinity includes the areas 4 miles south/southwest of the City of Kennewick, Washington, and the larger Tri-Cities urban area along the Columbia River. The qualitative evaluation presented herein relies on the impact scale defined in Section 4.1 and summarized in **Table 4.7-1**.

Table 4.7-1: Impact Rating Table for Energy and Natural Resources from Section 4.1

Factor	Rating →			
Magnitude	**Negligible** indistinguishable from the background	**Low** small impact, non-sensitive receptor(s)	**Medium** intermediate impact, may occur on sensitive receptor(s) or affect public health and safety	**High** large impact on sensitive receptor(s) or affecting public health and safety
Duration	**Temporary** infrequently during any stage	**Short Term** duration of construction or site restoration	**Long Term** during operation or operation plus another stage of Project	**Constant** during life of Project and/or beyond the Project
Likelihood	**Unlikely** not expected to occur	**Feasible** may occur	**Probable** expected to occur	**Unavoidable** inevitable
Spatial Extent/Setting	**Limited** small area of Lease Boundary or beyond Lease Boundary if duration is temporary	**Confined** within Lease Boundary	**Local** beyond Lease Boundary to neighboring receptors	**Regional** beyond neighboring receptors

Table 4.7-2 describes the intended framework for using the magnitude rankings in the evaluation of impacts on energy and natural resources within Benton County and Washington State.

Table 4.7-2: Criteria for Assessing Magnitude of Impacts on Energy and Natural Resources

Magnitude of Impacts	Description
Negligible	Changes would either be non-detectable or, if detected, would have only slight effects. Modifications to resource availability locally or regionally would not be noticeable within existing supply chains or cause alterations to the management and distribution of natural resources.
Low	Changes to resource availability would be measurable, but the changes would be small enough to not hinder supply chains or the management and distribution of natural resources.
Medium	Changes to resource availability would be measurable and have impacts that disrupt supply chains or existing natural resource management plans. The viability of resource intensive projects would not be affected.
High	Changes to resource availability would be readily measurable and would have consequences on supply chains or the management and distribution of natural resources. The viability of resource intensive projects would be called into question.

4.7.1 Method of Analysis

This subsection compares the amount of energy and natural resources the Project would potentially require, and the quantities available. An adverse impact may occur if the Project depletes or limits access to a non-renewable resource or stresses the availability of a renewable resource.

4.7.1.1 Construction Stage Requirements – Resources and Materials

Horse Heaven Wind Farm, LLC (Applicant), in the Application for Site Certification (ASC), has indicated that the Project's construction stage would consume energy and natural resources. For instance, Project-related components, such as concrete and steel, require measurable quantities of raw materials. **Table 4.7-3** compares the amount of energy and natural resources needed to construct the Project and the probable availability of the commodities within the vicinity of the Lease Boundary or in the State of Washington.

Table 4.7-3: Materials and Resources Required for Project Construction

Commodity	Renewable/Non-renewable	Quantity Required	Availability of Resource
Construction Aggregate	Non-renewable	335,700 yards of gravel aggregate	The Project's construction requirement for gravel equates to approximately 1% of the 2017 State of Washington aggregate production.
Concrete	Non-renewable	500,000 cubic yards of concrete for facility foundations	The availability of concrete is related to the accessibility of cement, aggregate, and water.
Cement	Non-renewable	Information Not Available	In 2015, Washington consumed 1.8 million metric tons of cement. Roughly 10% of concrete consists of cement. This suggests that the Project would use approximately 2% of the cement used in Washington annually.

Table 4.7-3: Materials and Resources Required for Project Construction

Commodity	Renewable/Non-renewable	Quantity Required	Availability of Resource
Steel	Non-renewable	97,600 tons of steel for turbine towers, solar posts and trackers, and reinforcement and support structures	In 2020, shipments from United States steel mills measured 81 million net tons. The amount of steel potentially consumed by the Project would equate to approximately 0.1% of the total steel produced in the United States annually.
Diesel and Gasoline	Non-renewable	Construction equipment has the potential to consume 80,000 gallons of diesel and gasoline	Washington has the fifth-largest crude oil refining capacity in the United States. The state's five refineries can process almost 652,000 barrels of crude oil per day. Washington refineries produce 2,592 million gallons per year of gasoline and 583 million gallons per year of diesel. Based on the refining capacity of Washington, the Project would consume approximately 0.0025% of the state's annual petroleum fuel production.
Diesel	Non-renewable	285,000 gallons of diesel for load bank generators during turbine commissioning	Washington refineries produce 583 million gallons per year of diesel. Based on the refining capacity of Washington, the Project would consume approximately 0.04% of Washington's annual diesel production.
Electricity	To be determined	To be determined	The Applicant has indicated in the ASC that electricity used during construction for the O&M Buildings would be provided by local utilities, Benton Public Utility District, and Benton Rural Electric Association, depending on construction location and service territory.
Water	Renewable	120 million gallons of water for the mixing of concrete for structural foundations and to suppress fugitive dust during grubbing, clearing, grading, trenching, and soil compaction	In 2014, Kennewick supplied 3,976.9 million gallons of water to its residents and businesses. Based on Kennewick's 2014 supply data, the Project's construction water requirements would amount to approximately 3% of the annual water produced by Kennewick.

Sources: Portland Cement Association 2016, 2019; City of Kennewick 2017; AISI 2021; Horse Heaven Wind Farm, LLC 2021; DOE n.d.
ASC = Application for Site Certificate; O&M = operations and maintenance

4.7.1.2 Operations Requirements – Resources and Materials

The Applicant indicated in its ASC that the Project would consume negligible amounts of energy and natural resources during operations. **Table 4.7-4** compares the amount of energy and natural resources needed to operate the Project and the probable availability of these resources within the Project vicinity or the State of Washington.

Table 4.7-4: Operational Requirements for Non-renewable and Renewable Resources

Commodity	Non-renewable/ Renewable	Quantity Required	Availability of Resource
Fuel (Gas and Diesel)	Non-renewable	Project operations have the potential to consume up to 5,000 gallons of fuel annually for vehicle use.	Based on the refining capacity of Washington, the Project's operations would consume approximately 0.00015% of Washington's annual petroleum fuel production.
Water (Total)	Renewable	Project operations have the potential to consume up to 3,850,000 gallons of water per year.	In 2014, demand for water from within Kennewick's jurisdictional boundaries was nearly 4 billion gallons. This equates to approximately 0.09% of Kennewick's annual water usage.
Water (O&M facility)	Renewable	The operations stage has the potential to consume up to 5,000 gallons per day of water for the O&M facilities. This equates to 1,825,000 gallons per year.	The annual water requirements for the O&M facilities would equate to approximately 0.04% of yearly water produced by Kennewick.
Water (Wash Water)	Renewable	The operations stage of the Project has the potential to consume up to 2,025,000 gallons of water per year for solar panel washing.	This equates to approximately 0.05% of the water produced by Kennewick annually.
Gravel	Non-renewable	Miscellaneous or As Needed.	Multiple quarries within Benton County provide construction aggregate or gravel.

Sources: City of Kennewick 2017; Horse Heaven Wind Farm, LLC 2021; DOE n.d.
O&M = Operations and Maintenance

4.7.2 Impacts of Proposed Action

Direct impacts on energy and natural resource availability would occur as the Project consumes energy and natural resources such as fuel, water, and electricity to construct, operate and maintain, and decommission the Project.

Indirect impacts on energy and natural resources are not anticipated because the Project is not expected to substantially induce regional growth to an extent that would substantially change off-site energy and natural resource consumption.

4.7.2.1 Impacts during Construction

The Project's construction stage would result in direct adverse impacts on energy and natural resource availability. The Project's construction would require raw materials for constructing access roads, making concrete, and manufacturing Project components. As shown in **Table 4.7-3**, the Project would require the use of both renewable and non-renewable resources. The ASC states that water used to mix concrete for structural foundations and suppress fugitive dust during grubbing, clearing, grading, trenching, and soil compaction would originate from the Kennewick Utility Services Division of Public Works. For instance, the Project's construction stage would use gasoline and diesel fuel for activities such as:

- Operation of construction equipment
- Transportation of Project components to the Lease Boundary
- Mobilization and demobilization of construction workers to and from the Project site
- Power portable generators and load banks

Turbine Option 1

The consumption of energy and natural resources during the Project's construction under Turbine Option 1 would be measurable and would impact resource availability within the vicinity of the Lease Boundary and in the State of Washington. For instance, the installation of a turbine would require steel for support structures, fuel for construction equipment and vehicles, and concrete for foundations. The manufacturing of concrete within the Project vicinity would require water sourced locally.

As shown in **Table 4.7-3**, the Project's construction would require a small fraction of the raw and manufactured materials produced regionally and nationally. For example, 97,600 tons of steel would be used in the construction of multiple components of the Project, including turbine manufacture and installation. The Project would use approximately 0.1 percent of the steel produced annually in the United States. Of the steel needed for the Project, Turbine Option 1 would require only a portion of the estimated 97,600 tons. Therefore, Turbine Option 1 construction would result in a low, temporary to short-term, unavoidable, local to regional impact on energy and natural resources.

Turbine Option 2

The consumption of energy and natural resources during the Project's construction under Turbine Option 2 would be measurable and would impact resource availability within the vicinity of the Lease Boundary and in the State of Washington. The impact of Turbine Option 2 on energy and natural resources during the construction stage would be similar to Turbine Option 1.

Solar Arrays

The consumption of energy and natural resources during construction of the solar arrays would be measurable and would impact resource availability within the vicinity of the Lease Boundary and in the State of Washington. For instance, solar arrays would require metals for support structures and panel manufacturing, fuel for construction equipment and vehicles, and concrete for foundations. The manufacturing of concrete within the Project vicinity would require water sourced locally.

As shown in **Table 4.7-3**, the Project's construction would require a small fraction of the raw and manufactured materials produced regionally and nationally. An example is construction aggregate, which would be used in the construction of the solar array foundations and access roads. The Project would use approximately 1 percent of the construction aggregate consumed in Washington annually. Additionally, solar array construction would require only a portion of the Project's 335,700 yards of gravel aggregate. Therefore, solar array construction would result in a low, temporary to short-term, unavoidable, local to regional impact on energy and natural resources.

Battery Energy Storage Systems

The consumption of energy and natural resources during the Project's construction of the battery energy storage systems (BESSs) would be measurable and would impact resource availability within the vicinity of the Lease Boundary and in the State of Washington. For instance, the installation of BESSs would require metal and concrete for building construction, fuel for construction equipment and vehicles, and various raw materials for BESS manufacturing. The on-site manufacturing of concrete would require water from Kennewick. Therefore, BESS construction would result in a low, temporary to short-term, unavoidable, local to regional impact on energy and natural resources.

Substations

The consumption of energy and natural resources during the Project's construction of the substations would be measurable and would impact resource availability within the vicinity of the Lease Boundary and in the State of Washington. Based on resource availability, the impact of substation construction on energy and natural resources would be similar to Turbine Option 1. Therefore, substation construction would result in a low, temporary to short-term, unavoidable, local to regional impact on energy and natural resources.

Comprehensive Project

The consumption of energy and natural resources during the Project's construction would be measurable and would impact resource availability within the vicinity of the Lease Boundary and in the State of Washington. The Project's construction would require metal and concrete for turbine, solar array, BESS, substation, and building construction and fuel for construction equipment and vehicles and various raw materials for manufacturing.

The Project would use approximately 0.1 percent of the steel produced annually in the United States. The on-site manufacturing of concrete would require water from Kennewick. The Project's construction water requirements would amount to approximately 3 percent of the annual water produced by Kennewick. Impact magnitude would increase from low to medium if the City of Kennewick Utility Services Division of Public Works is required to make adjustments to their water management plans. Therefore, construction activities for the comprehensive Project would result in a low to medium, short-term, unavoidable, local to regional impact on energy and natural resources for Project's construction stage.

4.7.2.2 Impacts during Operation

Typical consumption of energy and natural resources during the Project's operations stage would be associated with facility operations and maintenance (O&M). As shown in **Table 4.7-4**, Project operations would require both renewable and non-renewable resources. The ASC states that water consumption during the Project's operations stage would be associated with the limited needs of the O&M facilities and solar panel washing. Consumption of non-renewable resources during operations would be associated with the following activities:

- Electricity for lighting, heating, and other domestic purposes at the O&M facilities, which would be served by the local electric utility
- Gasoline and diesel fuel in vehicles used to patrol the site and maintain the facility
- Petroleum-based lubricants for maintenance and repair activities
- Aggregate for access road maintenance

Turbine Option 1

The consumption of energy and natural resources during the Project's operations stage under Turbine Option 1 would be measurable and would impact resource availability within the vicinity of the Lease Boundary and in the State of Washington. **Table 4.7-4** shows an analysis of necessary energy and natural resource requirements for the Project's operations. Turbine maintenance may require generator-specific lubricants and fluids produced outside the Project vicinity. O&M vehicles would need an ongoing supply of fuel purchased locally. Water for the Project's O&M facility would be purchased from a local vendor and sourced from Kennewick.

Specifically, Project operations have the potential to consume up to 5,000 gallons of fuel annually for vehicle use. The Project's operations would consume approximately 0.00015 percent of Washington's annual petroleum fuel production. As gravel becomes displaced by traffic, winter plowing operations, and erosion of material in heavy rain, Turbine Option 1 access roads would require routine blading and adding gravel as needed either by "spot graveling" or re-graveling entire sections (USDOT 2015). As shown in Section 3.7, multiple sources of aggregate exist within Benton County. Due to the widespread availability of lubricants, fuel, vendor supplied water, and aggregate, operations of Turbine Option 1 would constitute a low, long-term, unavoidable, local to regional impact.

Turbine Option 2

The consumption of energy and natural resources during the Project's operations stage under Turbine Option 2 would be measurable and would impact resource availability within the vicinity of the Lease Boundary and in the State of Washington. The impact of Turbine Option 2 on energy and natural resources during the Project's operations stage would be similar to Turbine Option 1. Due to the widespread availability of lubricants, fuel, vendor supplied water, and aggregate, operations of Turbine Option 2 would constitute a low, long-term, unavoidable, local to regional impact.

Solar Arrays

The consumption of energy and natural resources during the solar arrays' operations stage would be measurable and would impact resource availability within the vicinity of the Lease Boundary and the State of Washington. For instance, using water to wash solar panels would impact the amount of available water that Kennewick would have to address future demands. O&M vehicles would need fuel purchased locally.

Specifically, the operations stage of the solar arrays has the potential to consume up to 2,025,000 gallons of water per year for solar panel washing. As shown in **Table 4.7-4**, this equates to approximately 0.05 percent of the water produced by Kennewick annually. As gravel becomes displaced by traffic, winter plowing operations, and erosion of material in heavy rain, solar array access roads would require routine blading and adding gravel as needed either by "spot graveling" or re-graveling entire sections (USDOT 2015). As shown in Section 3.7, multiple sources of aggregate exist within Benton County. Based on energy and natural resource availability, operation of the solar arrays would constitute a low, long-term, unavoidable, local impact.

Battery Energy Storage Systems

The consumption of energy and natural resources during the BESS operations stage would be measurable and would impact resource availability within the vicinity of the Lease Boundary and the State of Washington. The impact of BESSs on energy and natural resources during the Project's operations stage would be similar to Turbine Option 1. Water for the Project's O&M facility would be purchased from a local vendor and sourced from Kennewick. As shown in **Table 4.7-4**, the operations stage has the potential to consume up to 5,000 gallons per day of water for the O&M facilities. This equates to 1,825,000 gallons per year or 0.04 percent of the yearly water produced by Kennewick. As gravel becomes displaced by traffic, winter plowing operations, and erosion of material in heavy rain, solar array access roads would require routine blading and adding gravel as needed either by “spot graveling” or re-graveling entire sections (USDOT 2015). As shown in Section 3.7, multiple sources of aggregate exist within Benton County. Based on energy and natural resource availability, operation of the BESSs would constitute a low, long-term, unavoidable, local impact.

Substations

The consumption of energy and natural resources associated with the operation of the substations would be measurable and would impact resource availability within the vicinity of the Lease Boundary and in the State of Washington. The impact of substation operations on energy and natural resources would be similar to Turbine Option 1. Due to the widespread availability of lubricants, fuel, vendor supplied water, and aggregate, operations of substations would constitute a low, long-term, unavoidable, local to regional impact.

Comprehensive Project

The consumption of energy and natural resources during the Project’s operations would be measurable and would impact resource availability within the vicinity of the Lease Boundary and in the State of Washington.

Project operation and maintenance may require generator-specific lubricants and fluids produced outside the Project vicinity. O&M vehicles would need an ongoing supply of fuel purchased locally. Project operations have the potential to consume up to 5,000 gallons of fuel annually for vehicle use. The Project’s operations would consume approximately 0.00015 percent of Washington’s annual petroleum fuel production.

Water for the Project’s O&M facility and solar panel washing would be purchased from a local vendor and sourced from Kennewick. The Project’s O&M facility has the potential to consume up to 5,000 gallons of water per day. This equates to 1,825,000 gallons per year, or 0.04 percent of the yearly water produced by Kennewick. The operations stage of the solar arrays has the potential to consume up to 2,025,000 gallons of water per year for solar panel washing. As shown in **Table 4.7-2**, this equates to approximately 0.05 percent of the water produced by Kennewick annually.

As gravel becomes displaced by traffic, winter plowing operations, and erosion of material in heavy rain, the Project’s access roads would require routine blading and adding gravel as needed either by “spot graveling” or re-graveling entire sections (USDOT 2015). As shown in Section 3.7, multiple sources of aggregate exist within Benton County. Based on resource availability, operation and maintenance for the comprehensive Project would result in a low to medium, long-term, unavoidable, local to regional impact on energy and natural resources.

4.7.2.3 Impacts during Decommissioning

As a result of the Lease Boundary being returned to its preconstruction state, the need for measurable quantities of water, concrete, and other renewable and non-renewable resources for decommissioning is expected to be low. Decommissioning activities would not likely require metals associated with energy component manufacturing. Impacts from energy consumption during Project decommissioning would be similar to or less than those described for the Project’s construction stage. Energy consumption, predominantly in the form of gasoline, diesel fuel, and electricity, would be required to operate equipment such as cranes, trucks, tools, and vehicles used to dismantle and remove most Project facilities and reclaim disturbed areas.

As part of the decommissioning process, the Applicant would repurpose or reuse the Project’s high-value components. Recyclable materials would be reduced to a transportable size and removed from the site to an appropriately designated recycling center. Unsalvageable material would be reduced to a transportable size and removed from the site and permanently disposed of in accordance local, state, and federal solid waste regulations.

Turbine Option 1

The consumption of energy and natural resources during the Project's decommissioning of Turbine Option 1 would be measurable and affect resource availability within the vicinity of the Lease Boundary. The Project's decommissioning stage would likely require smaller quantities of energy and natural resources than the construction stage. The dismantling of structures and backfilling of void spaces would require energy and construction aggregate. There are local sources of fuel and construction aggregate to support the decommissioning stage. Decommissioning of Turbine Option 1 would constitute a low, temporary to short-term, unavoidable, local impact on energy and natural resources.

Turbine Option 2

The consumption of energy and natural resources during the Project's decommissioning of Turbine Option 2 would be measurable and affect resource availability within the vicinity of the Lease Boundary. Impacts from the decommissioning of Turbine Option 2 on energy and natural resources would be similar to those described for Turbine Option 1. Decommissioning of Turbine Option 2 would constitute a low, temporary to short-term, unavoidable, local impact on energy and natural resources.

Solar Arrays

The consumption of energy and natural resources during the Project's decommissioning of the solar arrays would be measurable and affect resource availability within the vicinity of the Lease Boundary. Impacts from the decommissioning of the solar arrays on energy and natural resources would be similar to those described for Turbine Option 1. Decommissioning of solar arrays would constitute a low, temporary to short-term, unavoidable, local impact on energy and natural resources.

Battery Energy Storage Systems

The consumption of energy and natural resources during the Project's decommissioning of the BESSs would be measurable and affect resource availability within the vicinity of the Lease Boundary. Impacts from the decommissioning of the BESSs on energy and natural resources would be similar to those described for Turbine Option 1. Decommissioning of BESSs would constitute a low, temporary to short-term, unavoidable, local impact on energy and natural resources.

Substations

The consumption of energy and natural resources during the Project's decommissioning of the substations would be measurable and affect resource availability within the vicinity of the Lease Boundary. Impacts from the decommissioning of the substations on energy and natural resources would be similar to those described for Turbine Option 1. Decommissioning of substations would constitute a low, temporary to short-term, unavoidable, local impact on energy and natural resources.

Comprehensive Project

The consumption of energy and natural resources during the Project's decommissioning would be measurable and affect resource availability within the vicinity of the Lease Boundary. Impacts from decommissioning of the Project on energy and natural resources would be similar to those described for Turbine Option 1.

Decommissioning of the comprehensive Project would constitute a low, temporary to short-term, unavoidable, local impact on energy and natural resources.

4.7.2.4 Applicant Commitments and Identified Mitigation

This section describes the measures that would reduce or compensate for impacts related to energy and natural resources from construction, operation, and decommissioning of the Project. These measures would be implemented in addition to compliance with the environmental permits, plans, and authorizations required for the Proposed Action.

Applicant Commitments

- Any oily waste and rags would be collected in sealable drums at the construction yards, to be removed for recycling.
- Used gear oil from the turbines would be collected and recycled, if possible.
- Establish a carpool program or van service for the transportation of construction workers to the site.

Recommended Mitigation Measures

The Washington Energy Facility Site Evaluation Council (EFSEC) has identified the following additional and modified mitigation measures for the Project to avoid and/or minimize potential impacts on energy and natural resources:

ENR-1[22]: The Applicant would provide an executed agreement to EFSEC that identifies the source and quantity of water intended to be supplied to the Project prior to its construction, operation, and decommissioning.

ENR-2: The Applicant would install high-efficiency electrical fixtures and appliances in the O&M facility, BESSs, and substations to reduce energy needs for the Project's operations stage.

ENR-3: The Applicant would install high-efficiency security lighting to reduce energy needs for the Project's operations stage.

ENR-4: The Applicant would install low-water-use flush toilets in the O&M facilities to reduce the Project's water requirements during its operations stage.

ENR-5: The Applicant would capture and recycle wash water to reduce the Project's water requirements during its operations stage.

ENR-6: To retrieve as much of the natural resources used in construction and operation of the Project as possible, the Applicant would demolish or remove all Project-related equipment and facilities from the Lease Boundary. If the Applicant intends to leave any portion of the facility, including concrete foundations, they must submit a request to EFSEC in an update to their decommissioning plan.

ENR-7: To minimize the need for future extraction of natural resources, the Applicant would recycle all components of the Project that have the potential to be used as raw materials in commercial or industrial applications.

[22] ENR-: Identifier of numbered mitigation item for Energy and Natural Resources

4.7.2.5 Significant Unavoidable Adverse Impacts

Determining the significance of an impact involves context and intensity, which depend on the magnitude and duration of an impact. "Significant" in the Washington State Environmental Policy Act means a reasonable likelihood of more than a moderate adverse impact on environmental quality. An impact may also be significant if its chance of occurrence is not great, but the resulting environmental impact would be severe if it occurred (Washington Administrative Code 197-11-794).

This Draft Environmental Impact Statement weighs the potential impacts on land and shoreline use that may result from the Proposed Action with mitigation and makes a resulting determination of significance for each impact in **Tables 4.7-5a, 4.7-5b, and 4.7-5c**.

This Page Intentionally Left Blank

Table 4.7-5a: Summary of Potential Impacts on Energy and Natural Resources during Construction of the Proposed Action

Topic	Component[a]	Description of Impact[b]	Magnitude of Impact: ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact: ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact: ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact: ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Consumption of Raw Materials and Commodities	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations	The installation of a turbine would require steel for support structures, fuel for construction equipment and vehicles, and concrete for foundations. The manufacturing of concrete within the Project vicinity would require water sourced locally.	Low	Temporary (for a single component) Short Term (for the entire component)	Unavoidable	Local to Regional (depending on component)	**ENR-1:** Executed water supply agreement	None identified
Consumption of Raw Materials and Commodities	**Comprehensive Project**	The Project's construction would require metal and concrete for turbine, solar array, BESS, substation, and building construction and fuel for construction equipment and vehicles and various raw materials for manufacturing. The Project's construction water requirements would amount to approximately 3% of the annual water produced by Kennewick. Impact magnitude would increase from low to medium if the City of Kennewick Utility Services Division of Public Works is required to make adjustments to their water management plans.	Low to Medium (i.e., will increase if the City of Kennewick Utility Services Division of Public Works is required to make adjustments to their water management plans)	Short Term	Unavoidable	Local to Regional	**ENR-1:** Executed water supply agreement	None identified

Notes:

(a) The impacts related to each component, including "comprehensive Project," were rated separately; components were combined in the same cell if they received the same impact ratings for the identified topic.

(b) Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.

(c) Mitigation measures listed here are additional actions that EFSEC could impose to further reduce the impacts. See Section 4.1 Introduction for details.

(d) Significant unavoidable impacts are those that would remain even after all identified additional mitigation measures have been required by EFSEC.

BESS = battery energy storage system; EFSEC = Washington Energy Facility Site Evaluation Council

Table 4.7-5b: Summary of Potential Impacts on Energy and Natural Resources during Operation of the Proposed Action

Topic	Component[a]	Description of Impact[b]	Magnitude of Impact: ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact: ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact: ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact: ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Consumption of Raw Materials and Commodities	Turbine Option 1 Turbine Option 2 Substations	Turbine maintenance may require generator-specific lubricants and fluids produced outside the Project vicinity. O&M vehicles would need an ongoing supply of fuel purchased locally. Water for the Project's O&M facility would be purchased from a local vendor and sourced from Kennewick. Aggregate for access road maintenance would be obtained locally.	Low	Long Term	Unavoidable	Local to Regional	**ENR-1:** Executed water supply agreement **ENR-2:** Install high-efficiency electrical fixtures and appliances **ENR-3:** Install high-efficiency security lighting **ENR-4:** Install low-water-use flush toilets **ENR-5:** Capture and recycle wash water	None identified
Consumption of Raw Materials and Commodities	Solar Arrays BESSs	Using water to wash solar panels would impact the amount of available water that Kennewick would have to address future demands. O&M vehicles would need fuel purchased locally. Aggregate for access road maintenance would be obtained locally.	Low	Long Term	Unavoidable	Local	**ENR-1**: Executed water supply agreement **ENR-2:** Install high-efficiency electrical fixtures and appliances **ENR-3:** Install high-efficiency security lighting **ENR-4:** Install low-water-use flush toilets **ENR-5:** Capture and recycle wash water	None identified
Consumption of Raw Materials and Commodities	**Comprehensive Project**	Project maintenance may require generator-specific lubricants and fluids produced outside the Project vicinity. O&M vehicles would need an ongoing supply of fuel purchased locally. Water for the Project's O&M facility and solar panel washing would be purchased from a local vendor and sourced from Kennewick. Aggregate for access road maintenance would be obtained locally.	Low to Medium	Long Term	Unavoidable	Local to Regional	**ENR-1:** Executed water supply agreement **ENR-2:** Install high-efficiency electrical fixtures and appliances **ENR-3:** Install high-efficiency security lighting **ENR-4:** Install low-water-use flush toilets **ENR-5:** Capture and recycle wash water	None identified

Notes:
(a) The impacts related to each component, including "comprehensive Project," were rated separately; components were combined in the same cell if they received the same impact ratings for the identified topic.
(b) Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.
(c) Mitigation measures listed here are additional actions that EFSEC could impose to further reduce the impacts. See Section 4.1 Introduction for details.
(d) Significant unavoidable impacts are those that would remain even after all identified additional mitigation measures have been required by EFSEC.
BESS = battery energy storage system; EFSEC = Washington Energy Facility Site Evaluation Council; O&M = operations and maintenance

Table 4.7-5c: Summary of Potential Impacts on Energy and Natural Resources during Decommissioning of the Proposed Action

Topic	Component[a]	Description of Impact[b]	Magnitude of Impact: ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact: ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact: ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact: ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Consumption of Raw Materials and Commodities	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Energy consumption, predominantly in the form of gasoline, diesel fuel, and electricity, would be required to operate equipment such as cranes, trucks, tools, and vehicles used to dismantle and remove most Project facilities and reclaim disturbed areas. Backfilling void spaces created by the removal of foundations would require construction aggregate.	Low	Temporary to Short Term	Unavoidable	Local	**ENR-6:** Demolition or removal of all Project related equipment and facilities **ENR-7:** Recycle all components of the Project	None identified

Notes:

(a) The impacts related to each component, including “comprehensive Project,” were rated separately; components were combined in the same cell if they received the same impact ratings for the identified topic.

(b) Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.

(c) Mitigation measures listed here are additional actions that EFSEC could impose to further reduce the impacts. See Section 4.1 for details.

(d) Significant unavoidable impacts are those that would remain even after all identified additional mitigation measures have been required by EFSEC.

BESS = battery energy storage system; EFSEC = Washington Energy Facility Site Evaluation Council

4.7.3 Impacts of No Action Alternative

Under the No Action Alternative, impacts related to energy and natural resources from the construction, operation, and decommissioning of the Proposed Action would not occur. For the purpose of this analysis, it is assumed that no future development would occur within the Lease Boundary.

This Page Intentionally Left Blank

4.8 Land and Shoreline Use

Washington Administrative Code (WAC) 197-11-444 requires that a State Environmental Policy Act evaluation include an analysis of land and shoreline use. Section 3.8 presents the affected environment for land and shoreline use. This section evaluates the impacts of the proposed Horse Heaven Wind Farm (Project, or Proposed Action) on Benton County designated Growth Management Act (GMA) Agriculture lands within the Lease Boundary. In addition to agriculture, WAC 197-11-444 also requires an analysis of the following resource topics as part of an evaluation of land and shoreline use:

- Housing (Socioeconomics – Section 4.16)
- Light and Glare (Visual Aspects, Light and Glare – Section 4.10)
- Aesthetics (Visual Aspects, Light and Glare – Section 4.10)
- Recreation (Recreation – Section 4.12)
- Historic and Cultural Preservation (Historic and Cultural Resources – Section 4.9)

These additional resource topics are evaluated in their corresponding sections. Appendix 3.8-1 presents a consistency analysis of the Project and the Benton County Comprehensive Plan and Benton County zoning ordinance. The qualitative evaluation presented herein relies on the impact scale defined in Section 4.1 and summarized in **Table 4.8-1**.

Table 4.8-1: Impact Rating Table for Land and Shoreline Use from Section 4.1

Factor	Rating →			
Magnitude	**Negligible** indistinguishable from the background	**Low** small impact, non-sensitive receptor(s)	**Medium** intermediate impact, may occur on sensitive receptor(s) or affect public health and safety	**High** large impact on sensitive receptor(s) or affecting public health and safety
Duration	**Temporary** infrequently during any stage	**Short Term** duration of construction or site restoration	**Long Term** during operation or operation plus another stage of Project	**Constant** during life of Project and/or beyond the Project
Likelihood	**Unlikely** not expected to occur	**Feasible** may occur	**Probable** expected to occur	**Unavoidable** inevitable
Spatial Extent/Setting	**Limited** small area of Lease Boundary or beyond Lease Boundary if duration is temporary	**Confined** within Lease Boundary	**Local** beyond Lease Boundary to neighboring receptors	**Regional** beyond neighboring receptors

Table 4.8-2 describes the intended framework for using the magnitude rankings in the evaluation of impacts on lands designated as GMA Agriculture within the Lease Boundary.

Table 4.8-2: Criteria for Assessing Magnitude of Impacts on Growth Management Act Agricultural Designated Lands

Magnitude of Impacts	Description
Negligible	No change in the management of GMA Agricultural lands. Loss of agricultural production or GMA Agricultural lands would not be detectable.
Low	Changes to agricultural production or loss of GMA Agricultural lands would be measurable, but the changes would not impact the ability of a farm to remain profitable and continue operations. Any changes to GMA Agricultural lands would be reversible following the decommissioning stage.
Medium	Changes to agricultural production or loss of GMA Agricultural lands would be measurable and would impact profitability and operations but would be reversible following the decommissioning stage.
High	Changes to agricultural production or loss of GMA Agricultural lands would be measurable and would affect a farm’s ability to remain a profitable operation, and could be irreversible.

GMA = Growth Management Act

4.8.1 Method of Analysis

As noted in Section 3.8, Benton County’s comprehensive land use plan and land use regulations were prepared in accordance with the GMA. The Local Project Review Act (Chapter 36.70B Revised Code of Washington) encourages counties and cities that are subject to the GMA to rely on applicable development regulations and comprehensive land use plan policies in analyzing and addressing environmental impacts.

For aspects of the Project’s design that may not be in alignment with Benton County Code 11.17.070 Growth Management Act Agricultural District or the Benton County Comprehensive Plan, the Washington Energy Facility Site Evaluation Council (EFSEC) would review discrepancies through an adjudicative process intended to resolve disputes between the local government and Horse Heaven Wind Farm, LLC (Applicant).

The Benton County Comprehensive Plan states that the county should accommodate the land needs of both agricultural and non-agricultural uses. With regards to rezoning agricultural lands, Benton County’s Comprehensive Plan states the following:

> *In general, it was deemed important to maintain continuity in agricultural resource land designation; unless there are sufficient reasons that the agricultural resource land should be de-designated, land should remain as agricultural resource land to protect the resource.* (Benton County 2021)

The Benton County Comprehensive Plan states that the county should maintain the financial viability of all economic sectors. Benton County considers the following guiding principles in managing designated GMA Agriculture lands within its jurisdictional boundaries:

- Preserve and protect agricultural and resource lands
- Allow rural lifestyle in rural lands
- Allow growth where services are available (Benton County 2021)

Economic Considerations

Decreases in food security and farmer profitability are adverse impacts that could occur from converting agricultural lands to non-agricultural purposes. Conversely, decreases in supply of agricultural products could increase the value of the product. **Table 4.8-3** summarizes wheat yields and crop value in Washington State for the years 2018 and 2019.

Table 4.8-3: Summary of Wheat Yields and Value in Washington State

Harvest Year	Price Per Bushel of Wheat	Average Yield Per Acre	State-Wide Production of Wheat (bushels)
2018	$5.51	70.8	153,210,000
2019	$5.53	64.9	143,205,000

Source: USDA 2020

The Project would financially support ongoing agricultural ownership and operations via its lease agreements with participating landowners. The Project would be microsited to avoid and minimize disruption to existing cropland and would provide new revenue to agricultural landowners via lease agreements (Horse Heaven Wind Farm, LLC 2021). The Applicant has not made publicly available the value of its agreements with participating landowners.

4.8.2 Impacts of Proposed Action

Impacts associated with or attributable to specific Project elements are discussed for each Project stage below. Potential direct impacts of the Project would include the conversion of agricultural lands to utility-related uses and a reduction in agricultural productivity of designated GMA Agriculture lands. Similar to what is presented in Section 4.5, Vegetation, loss of agricultural lands is divided into two types:

- **Temporary Disturbance**: Loss of agricultural productivity would end when construction is complete, and the area would be restored to preconstruction condition (WDFW 2009). Temporary disturbance from Project construction would occur in equipment laydown areas, construction staging areas, some roads, and areas required for construction that would not be part of the permanent infrastructure. These areas would be returned to the applicable agricultural purpose once construction is complete.
- **Permanent Disturbance**: Loss of agricultural productivity would persist throughout the life of the Project and would not be restored when construction is complete (WDFW 2009). Permanent disturbance from Project construction (which extends into operation and decommissioning) would occur in the areas of the final tower footings and associated access roads, the substations, fencing around the solar arrays, and all areas occupied by permanent structures. Permanent disturbance also includes areas identified by the Applicant as modified habitat, which includes areas within the fencing around solar arrays. The areas under and between solar arrays would be disturbed during Project construction and would be replanted following construction; however, areas under the solar arrays would not support agricultural activities.

As shown in **Table 4.8-4**, the Project during construction would permanently impact 6,869 acres and temporarily impact 2,957 acres of the Lease Boundary’s 72,428 acres (Horse Heaven Wind Farm, LLC 2021). As such, construction activities would impact approximately 14 percent of the Lease Boundary. Construction activities would cause both temporary and permanent impacts. Of the acreage permanently impacted by the Project, approximately 6,866 acres are agricultural lands. Of the agricultural lands permanently impacted by the Project, approximately 99 percent are being managed for dryland wheat. Within the Wind Energy Micrositing Corridor and

Solar Siting Area alone, 21,216 acres are managed as dryland wheat. Of the 2,957 acres temporarily impacted by construction, 2,324 acres are currently being managed for agricultural purposes (Horse Heaven Wind Farm, LLC 2021).

Table 4.8-4: Impacts on Agricultural Lands within the Lease Boundary

Impact Status	Project Impacts on Lease Boundary (acres)[b]	Percentage of Lease Boundary Impacted by Project	Project Impacts on Agricultural Land (acres)	Percentage of Project Impacts That Are Agricultural Land
Permanent[c]	6,869	9.5%	6,866	99.9%
Temporary	2,957	4%	2,324 [b]	79%

Source: Horse Heaven Wind Farm, LLC 2021
Notes:
[a] Based on Turbine Option 1 maximum number of turbines
[b] Land could be returned to agricultural production following decommissioning

Land north of and adjacent to the Lease Boundary consists predominantly of dryland agriculture and agricultural rangelands, with small areas of adjacent development. Land to the east and south of, and adjacent to, the Lease Boundary consists predominantly of a mixture of dryland and irrigated agriculture. Land west of and adjacent to the Lease Boundary consists of dryland agriculture (Horse Heaven Wind Farm, LLC 2021).

Table 4.8-5 shows an analysis of the agricultural management practices for GMA Agriculture designated lands within Benton County, and the impacts that the Project would have on these land use types.

Table 4.8-5: Analysis of Project Impacts on Benton County GMA Agricultural Designated Lands

GMA Agriculture Land Type	County-wide Total Acres	Permanent Impact Acres[a]	Percentage of County GMA Total Acreage Permanently Impacted
Dryland	304,839	6,863	2.3
Irrigated	296,432	2	<0.01
Rangeland	112,190	1	<0.01

Sources: Benton County 2021; Horse Heaven Wind Farm, LLC 2021
[a] Land could potentially be returned to agricultural production following decommissioning
GMA = Growth Management Act

As noted in Section 3.8, private and public entities own the land parcels within the Lease Boundary. As a result of the Applicant having to establish terms of agreement with the Lease Boundary landowners to develop and operate the Project, no adverse impact on land ownership is anticipated.

Indirect land use impacts are not anticipated because the Project is not expected to substantially induce regional growth to the extent that it would change off-site land uses. Although the Project would create new economic activity in rural unincorporated Benton County, facility operations would not affect surrounding agricultural activities, and the Benton County Comprehensive Plan and Benton County zoning ordinance would continue to guide land use development within the county. Additionally, the Project's operations stage would only require a team of 16 to 20 personnel to maintain the facility (Horse Heaven Wind Farm, LLC 2021). Therefore, further discussion of indirect impacts of the Project on land use is not warranted.

4.8.2.1 Impacts during Construction

The Applicant defines permanent disturbance as the facility's foundation and graveled area and temporary disturbance as the area around the facility. Wind turbines, solar arrays, battery energy storage systems (BESSs), substations, and transmission lines would all require subsurface foundations, while the Applicant has indicated that the Project's permanent access roads would be gravel. Temporary land use disturbance would result from the following actions:

- Preparation of laydown yards
- Construction of access roads, road modifications, and crane paths
- Installation of turbines
- Installation of overhead and underground collectors
- Installation of transmission lines, meteorological towers, and meteorological tower roads
- Construction of substations, BESS(s), and solar arrays
- Construction of the operations and maintenance facility

The estimated amount of temporary land disturbance would be similar under Turbine Option 1 and Turbine Option 2 (see Chapter 2, Proposed Action and Alternatives) for all Project construction phases. Section 4.14, Transportation, evaluates the impact that additional truck traffic may have on neighboring rural communities.

It is anticipated that once construction of the solar arrays has begun, exclusionary fencing would prevent further livestock access to the solar fields. Additionally, agricultural land that would be permanently disturbed by Project facilities would limit agricultural uses within the Lease Boundary. Permanent facilities would include turbine support structures, solar array and substation project areas, and operations and maintenance facilities (Horse Heaven Wind Farm, LLC 2021).

Turbine Option 1

Construction activities under Turbine Option 1 would result in a negligible to low, temporary to short-term, unavoidable, limited to regional impact on agricultural activities during the Project's construction stage. As shown in **Tables 4.8-4** and **4.8-5**, the majority of the Project's land-disturbing activities would occur on agricultural lands used for dryland wheat production. Table 2.1-1 of Chapter 2, Proposed Action and Alternatives, illustrates that the combined permanent land disturbance from Turbine Option 1 would be 30 acres and the temporary disturbance would be 1,070 acres.

During Project construction, it may be necessary to remove cattle from areas where blasting or heavy equipment operations take place. Project construction could delay agricultural activities for short durations on adjacent properties. For instance, Project-related truck traffic and construction activities could cause temporary delays in the movement of farm machinery within and around the Lease Boundary. During construction, reduced access to fields within the Lease Boundary could impact existing dryland agricultural management programs.

Based on 2018 and 2019 U.S. Department of Agriculture (USDA) wheat statistics for the State of Washington, Turbine Option 1 could reduce wheat yields in Benton County by 71,390 to 77,880 bushels for any given year. This analysis assumes that all 1,100 temporary and permanently impacted acres under Turbine Option 1 could be lost to production for the entire construction stage. Loss of a single harvest season for approximately 1,100 acres would equate to approximately 0.05 percent of Washington's annual wheat production (USDA 2020).

Turbine Option 2

Construction activities under Turbine Option 2 would result in a negligible to low, temporary to short-term, unavoidable, limited to regional impact on agricultural activities during the Project's construction period. As shown in **Table 4.8-4** and **Table 4.8-5**, the majority of the Project's land-disturbing activities would occur on agricultural lands. Table 2.1-1 of Chapter 2, Proposed Action and Alternatives, illustrates that the combined permanent land disturbance from turbine construction under Turbine Option 2 would be 30 acres and the temporary disturbance would be 1,070 acres. Impacts on agricultural activities from construction under Turbine Option 2 would be similar to those presented for Turbine Option 1.

Solar Arrays

Construction activities for the Project's solar arrays would result in a low, temporary to short-term, unavoidable, limited to regional impact on agricultural activities during the Project's construction period. As shown in **Table 4.8-4** and **Table 4.8-5**, the majority of the Project's land-disturbing activities would occur on agricultural lands. Table 2.1-2 of Chapter 2, Proposed Action and Alternatives, illustrates that the combined permanent land disturbance from the three solar arrays would be 6,570 acres and the temporary disturbance would be 77 acres.

Using 2018 and 2019 USDA wheat statistics for the State of Washington, the solar arrays could reduce wheat yields in Benton County by 431,390 to 470,607 bushels for any given year. This analysis assumes that all 6,647 temporary and permanently impacted acres under the solar arrays action would be lost to production for the entire construction stage. A loss of a single harvest season for approximately 6,647 acres would equate to approximately 0.3 percent of Washington's annual wheat production. While the United States ranks among the top three global wheat exporters, any decrease in global wheat supplies could impact the ability of vendors and suppliers in the Pacific Northwest to make up for a reduction in wheat grown locally (USDA 2022).

Battery Energy Storage Systems

Construction activities for BESSs would result in a negligible to low, temporary to short-term, unavoidable, limited to regional impact on agricultural activities during the Project's construction period. As shown in **Table 4.8-4** and **Table 4.8-5**, the majority of the Project's land-disturbing activities would occur on agricultural lands. Table 2.1-2 of Chapter 2, Proposed Action and Alternatives, illustrates that the combined permanent land disturbance from the BESSs would be 18 acres and the temporary disturbance would be 1 acre. Impacts on agricultural activities from the construction of BESSs would be similar to those presented for Turbine Option 1.

Substations

Construction activities for substations would result in a negligible to low, temporary to short-term, unavoidable, limited to regional impact on agricultural activities during the Project's construction period. As shown in **Table 4.8-4** and **Table 4.8-5**, the majority of the Project's land-disturbing activities would occur on agricultural lands. Table 2.1-2 of Chapter 2, Proposed Action and Alternatives, illustrates that the combined permanent land disturbance from the substations would be 38 acres and the temporary disturbance would be 3 acres. Impacts on agricultural activities from the construction of substations would be similar to those presented for Turbine Option 1.

Comprehensive Project

Construction activities for the comprehensive Project would result in a low to medium, temporary to short-term, unavoidable, limited to regional impact on agricultural activities during the Project's construction period. As shown in **Table 4.8-4** and **Table 4.8-5**, the majority of the Project's land-disturbing activities would occur on agricultural lands. Except for magnitude, impacts on agricultural activities from the construction of the comprehensive Project would be similar to those presented for Turbine Option 1 and the solar arrays. As a result of constructing various components of the Project simultaneously, the magnitude of impact on agricultural management plans is likely to increase when compared to the Project's individual components. It is anticipated that the farmers and ranchers would have to continuously adapt to construction activities as the Project's construction progresses.

4.8.2.2 Impacts during Operation

Project facilities would result in the permanent conversion of 6,869 acres of the Lease Boundary's 72,428 acres. The 6,866 acres currently managed for agricultural purposes converted for the Project would no longer be available for agricultural use. Permanently altered acreage would represent 9 percent of the 72,428 acres of land designated as GMA Agriculture within the Lease Boundary and 1 percent of the 649,153 acres of land designated as GMA Agriculture within Benton County.

During operation, agricultural uses would continue within the Lease Boundary and surrounding area (Horse Heaven Wind Farm, LLC 2021). Except for places where livestock would be specifically excluded or where dryland wheat would be grown, cattle, sheep, and other domestic animals would be able to graze up to the turbines and around transmission and collector line support structures. The Application for Site Certification (ASC) states that exclusionary fencing would be installed around the solar arrays. In this context, loss of dryland wheat and grazing land would constitute an adverse impact during operation.

Turbine Option 1

The permanent conversion of land under Turbine Option 1 would constitute a negligible, long term, unavoidable, limited to regional impact on agricultural activities in Benton County. Although livestock would be able to graze up to the turbines and associated structures under Turbine Option 1, measurable acreage would be taken out of agricultural management.

As shown in Table 2.1-1 of Chapter 2, Proposed Action and Alternatives, Turbine Option 1 would result in permanent land disturbance of 30 acres. This permanent impact on land represents less than 1 percent of the Lease Boundary's total acreage and less than 1 percent of the more than 21,216 agriculturally managed acres within the Lease Boundary.

Using 2018 and 2019 USDA wheat statistics for the State of Washington, Turbine Option 1 could reduce wheat yields in Benton County by 1,947 to 2,124 bushels for any given year. This analysis assumes that all 30 permanently impacted acres under Turbine Option 1 would be lost to production for the entire operations stage. Loss of a single harvest season for approximately 30 acres would equate to less than 0.01 percent of Washington's annual wheat production.

Turbine Option 2

The permanent conversion of land under Turbine Option 2 would constitute a negligible, long term, probable, limited to regional impact on agricultural production in Benton County. Impacts on agricultural activities under Turbine Option 2 would be similar to those presented for Turbine Option 1 for the Project's operations stage.

Solar Arrays

The permanent conversion of land use associated with the operation of the solar arrays would constitute a low, long term, unavoidable, limited to regional impact on agricultural production in Benton County. As noted, the ASC states that exclusionary fencing would be installed around the solar arrays. Exclusionary fencing would prevent the solar array project areas from being used for agricultural activities throughout the Project's operation stage. This would result in a reduction in dryland wheat production and, potentially, a loss in grazing areas for livestock. Table 2.1-2 of Chapter 2, Proposed Action and Alternatives, shows that the combined permanent land disturbance from the three solar arrays would be 6,570 acres, the majority of which is currently being managed for agricultural purposes.

Using 2018 and 2019 USDA wheat statistics for the State of Washington, solar arrays could reduce wheat yields in Benton County between 426,393 and 465,156 bushels for any given year. This analysis assumes that all 6,570 permanently impacted acres under the solar arrays action would be lost to production for the entire operations stage. A loss of single harvest season for approximately 6,570 acres would equate to less than 0.3 percent of Washington's annual wheat production.

Battery Energy Storage Systems

The permanent conversion of land as part of the operation of BESSs would constitute a negligible, long term, probable, limited to regional impact on agricultural production in Benton County. Impacts on agricultural activities from the BESSs would be similar to those presented for Turbine Option 1 for the Project's operation stage. Table 2.1-2 of Chapter 2, Proposed Action and Alternatives, shows that the combined permanent land disturbance from the BESSs would be approximately 18 acres.

Substations

The permanent conversion of land as part of the operations of substations would constitute a negligible, long term, probable, limited to regional impact on agricultural production in Benton County. Impacts on agricultural activities from the substations would be similar to those presented for Turbine Option 1 for the Project's operations stage. The conversion of agricultural land for the operation of substations would constitute a low, long term, probable, confined impact on Benton County's Comprehensive Plan as the amount of agriculturally productive land would be reduced. Table 2.1-2 of Chapter 2, Proposed Action and Alternatives, shows that the combined permanent land disturbance from the BESSs would be approximately 18 acres.

Comprehensive Project

The permanent conversion of land under operation of the comprehensive Project would constitute a low to medium, long term, unavoidable, limited to regional impact on agricultural production in Benton County. Impacts on agricultural activities from operation of the comprehensive Project would be similar to those presented for Turbine Option 1 and the solar arrays. However, when considering the impact of the comprehensive Project, the possibility for a conflict between the planned management of agricultural activities within the Lease Boundary and Project operations increases when compared with any individual component.

As shown in **Table 4.8-5**, 6,869 acres, or 9 percent, of the Lease Boundary would be permanently impacted by the comprehensive Project. Permanent impacts on land would effectively prevent further agricultural activities on those lands during the Project's operation stage. Of the 9 percent of the Lease Boundary's land that would be permanently impacted by the Project, 6,866 acres—or 99 percent—are currently being managed for agricultural purposes. The magnitude of impact is anticipated to remain low to medium, as the Project's operations would align with agricultural management plans.

4.8.2.3 Impacts during Decommissioning

Project decommissioning would result in temporary land disturbance of a type and magnitude similar to those described for Project construction. Temporarily disturbed lands would be restored to their original condition through grading and planting. Upon decommissioning, land use impacts from facility operations would be largely reversible.

The ASC states that decommissioning would be performed in accordance with EFSEC rules and prior site certification agreements and include dismantling and removing aboveground improvements, including turbines and solar modules, step-up transformers, substations, BESSs, overhead generator tie lines and support structures, control hardware, and meteorological towers. Foundations would be removed to a level of no less than 3 feet below the surface of the ground unless requested to be maintained by the landowner. In areas where the foundations are removed, the surface would be restored and contoured to a condition reasonably similar to that prior to construction, and the area would be reseeded with vegetation reasonably acceptable to the landowner. Cables, lines, or conduit buried more than 3 feet below grade may not be removed (Horse Heaven Wind Farm, LLC 2021).

Once facilities were removed, acreage taken out of open space and rangeland use could be returned to these prior uses. An exception might be access roads, which local landowners may decide to continue to use and maintain.

Turbine Option 1

It is anticipated that if Turbine Option 1 were decommissioned, impacts would be negligible to low, temporary to short term, unavoidable, and limited to regional. Grazing and farming operations would be impacted by the presence of heavy equipment and construction workers on site and on the connecting roadways. No permanent land use impacts would result from decommissioning of turbines under Turbine Option 1. The Applicant would be required to comply with the decommissioning requirements of the site certification agreement. It is anticipated that most of the permanently disturbed lands would be restored and available for future agricultural use.

Turbine Option 2

It is anticipated that if Turbine Option 2 were decommissioned, impacts would be negligible to low, temporary to short term, unavoidable, and limited to regional. No permanent land use impacts would result from decommissioning of turbines under Turbine Option 2. The Applicant would be required to comply with the decommissioning requirements of the site certification agreement. It is anticipated that most of the permanently disturbed lands would be restored and available for future agricultural use.

Solar Arrays

Decommissioning of the solar arrays would constitute a low, temporary to short-term, unavoidable, limited to regional impact. Grazing and farming operations would be impacted by the presence of heavy equipment and construction workers on site and connecting roadways. As acreage would have already been taken out of dryland wheat production, it is anticipated that impacts from decommissioning of the solar arrays would be less than those described for construction. No permanent land use impacts would result from decommissioning of the solar arrays. The Applicant would be required to comply with decommissioning requirements of the site certification agreement. It is anticipated that most of the permanently disturbed lands could be restored and available for future agricultural use.

Battery Energy Storage Systems

Decommissioning of the BESSs would constitute a negligible to low, temporary to short-term, unavoidable, limited to regional impact. Grazing and farming operations would be impacted by the presence of heavy equipment and construction workers on site and on the connecting roadways. No permanent land use impacts would result from decommissioning of the BESSs. The Applicant would be required to comply with the decommissioning requirements of the site certification agreement. It is anticipated that most of the permanently disturbed lands could be restored and available for future agricultural use.

Substations

Decommissioning of the substations would constitute a negligible to low, temporary to short-term, unavoidable, limited to regional impact. Grazing and farming operations would be impacted by the presence of heavy equipment and construction workers on site and connecting roadways. No permanent land use impacts would result from decommissioning of the substations. The Applicant would be required to comply with decommissioning requirements of the site certification agreement. It is anticipated that most of the permanently disturbed lands could be restored and available for future agricultural use.

Comprehensive Project

Decommissioning of the comprehensive Project would constitute a low, temporary to short-term, unavoidable, limited to regional impact. Grazing and farming operations would be impacted by the presence of heavy equipment and construction workers onsite and on the connecting roadways. As acreage would have already been taken out of dryland wheat production for solar array construction, it is anticipated that impacts from the decommissioning of the comprehensive Project would be less than those described for construction. No permanent land use impacts would result from decommissioning of the comprehensive Project. The Applicant would be required to comply with the decommissioning requirements of the site certification agreement. It is anticipated that most of the permanently disturbed lands could be restored and available for future agricultural use.

4.8.2.4 Applicant Commitments and Identified Mitigation

This section describes the measures that would reduce or compensate impacts related to land use from construction, operation, and decommissioning of the Project. These measures would be implemented in addition to the setback requirements detailed in Benton County Code 11.17.070 (as presented in **Appendix 3.8-1**) and compliance with environmental permits, plans, and authorizations required for the Proposed Action.

Applicant Commitments

The Applicant has identified measures and/or best practices that are designed to prevent or minimize potential impacts on the affected environment for the Project. Measures presented by the Applicant in the ASC (Horse Heaven Wind Farm, LLC 2021) and taken into consideration in the characterization of potential impacts on land and shoreline use are discussed in Section 2.3 and summarized below.

- Project construction and operation would follow site-specific best management practices to minimize potential impacts on noise, traffic, vegetation, visual resources, and air quality, as described in the respective resource sections of the ASC.
- Upon decommissioning of the Project, the Applicant would remove all above-grade infrastructure and below-ground infrastructure to a depth of not less than 3 feet below grade.

- The Applicant would replace topsoil and reseed areas where facilities were located with grasses and/or other vegetation reasonably acceptable to the landowner.

Recommended Mitigation Measures

EFSEC has identified the following additional and modified mitigation measures for the Project to avoid and/or minimize potential impacts related to Land and Shoreline Use:

LSU-1[23]: To limit conflicts between the Project and farmers and ranchers, the Applicant would prepare a livestock management plan with property owners and livestock owners to control the movement of animals within the Lease Boundary during construction and operation.

LSU-2: To limit conflicts between the Project and farmers, the Applicant would prepare a dryland farming management plan for construction, operation, and decommissioning that outlines communication requirements between the Certificate Holder and the land owners. The plan would establish work windows that would allow farmers uninterrupted access to their fields for dryland wheat planting and harvesting.

LSU-3: To limit conflicts between the Project and ranchers, the Applicant would be responsible for ensuring that arrangements for the removal of all livestock have been made during Project construction and decommissioning.

LSU-4: After construction is completed, the Applicant would restore all temporary disturbance areas to their preconstruction status. This would allow the areas of temporary disturbance within Lease Boundary to return to their preconstruction agricultural production levels as soon as possible.

LSU-5: Prior to decommissioning, the Applicant would submit a Detailed Site Restoration Plan, per WAC 463-72-050, for restoring the site to its preconstruction character. This would assist in preventing conversion of a land use that is not in alignment with the Lease Boundary’s current designation. The Applicant would be responsible for working with the landowner to return all agricultural land to its preconstruction status. If future site conditions or land ownership no longer allows for the land to be returned to agricultural production, the Applicant would submit a request to EFSEC for an alternative land use that would be in alignment with the Lease Boundary’s preconstruction rural character and resource value. If the Detailed Site Restoration Plan requests an alternative land use, EFSEC may require that the Applicant provide additional mitigation to offset impacts from a permanent conversion of the land.

4.8.2.5 Significant Unavoidable Adverse Impacts

Determining the significance of an impact involves context and intensity, which, in turn, depend on the magnitude and duration of an impact. “Significant” in the Washington State Environmental Policy Act means a reasonable likelihood of more than a moderate adverse impact on environmental quality. An impact may also be significant if its chance of occurrence is not great, but the resulting environmental impact would be severe if it occurred (WAC 197-11-794).

---

[23] LSU-: Identifier of numbered mitigation item for Land and Shoreline Use

This Draft Environmental Impact Statement weighs the potential impacts on land and shoreline use that may result from the Proposed Action with mitigation and makes a resulting determination of significance for each impact in **Tables 4.8-6a, 4.8-6b, and 4.8-6c**.

Table 4.8-6a: Summary of Potential Impacts on Land and Shoreline Use during Construction of the Proposed Action

Topic	Component[a]	Description of Impact[b]	Magnitude of Impact: • Negligible • Low • Medium • High	Duration of Impact: • Temporary • Short Term • Long Term • Constant	Likelihood of Impact: • Unlikely • Feasible • Probable • Unavoidable	Spatial Extent or Setting of Impact: • Limited • Confined • Local • Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Agriculture	Turbine Option 1 Turbine Option 2 BESSs Substations	It may be necessary to remove cattle from areas where blasting or heavy equipment operations take place. Project construction could delay agricultural activities for short durations on adjacent properties. Reduced access to fields within the Lease Boundary could impact existing dryland agricultural management programs. Limited but measurable acreage would be taken out of wheat production.	Negligible (farm plan modifications) Low (decreased productivity)	Temporary (brief access modifications) Short Term (seasonal restrictions)	Unavoidable	Limited (small area) Regional (decreased productivity)	**LSU-1:** The Applicant would prepare a livestock management plan **LSU-2:** The Applicant would prepare a dryland farming management plan **LSU-3:** Arrange for the removal of livestock	None identified
Agriculture	Solar Arrays	It may be necessary to remove cattle from areas where heavy equipment operations take place. Project construction could delay agricultural activities for short durations on adjacent properties. Reduced access to fields within the Lease Boundary could impact existing dryland agricultural management programs. Temporarily and permanently impacted dryland agricultural acreage from solar array construction would equate to approximately 0.3% of the state's annual wheat production.	Low	Temporary (brief access modifications) Short Term (seasonal restrictions)	Unavoidable	Limited (small area) Regional (decreased productivity)	**LSU-1:** The Applicant would prepare a livestock management plan **LSU-2:** The Applicant would prepare a dryland farming management plan **LSU-3:** Arrange for the removal of livestock	None identified
Agriculture	**Comprehensive Project**	Similar to Turbine Option 1 and solar arrays	Low (decreased productivity) Medium (operational changes)	Temporary (brief access modifications) Short Term (seasonal restrictions)	Unavoidable	Limited (small area) Regional (decreased productivity)	**LSU-1:** The Applicant would prepare a livestock management plan **LSU-2:** The Applicant would prepare a dryland farming management plan **LSU-3:** Arrange for the removal of livestock	None identified

Notes:
[a] The impacts related to each component, including "comprehensive Project," were rated separately; components were combined in the same cell if they received the same impact ratings for the identified topic.
[b] Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.
[c] Mitigation measures listed here are additional actions that EFSEC could impose to further reduce the impacts. See Section 4.1 Introduction for details.
[d] Significant unavoidable impacts are those that would remain even after all identified additional mitigation measures have been required by EFSEC.
BESS = battery energy storage system; EFSEC = Washington Energy Facility Site Evaluation Council

Table 4.8-6b: Summary of Potential Impacts on Land and Shoreline Use during Operation of the Proposed Action

Topic	Component[a]	Description of Impact[b]	Magnitude of Impact: • Negligible • Low • Medium • High	Duration of Impact: • Temporary • Short Term • Long Term • Constant	Likelihood of Impact: • Unlikely • Feasible • Probable • Unavoidable	Spatial Extent or Setting of Impact: • Limited • Confined • Local • Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Agriculture	Turbine Option 1 Turbine Option 2 BESSs Substations	Although livestock would be able to graze up to turbines and associated structures, limited but measurable acreage would remain out of agricultural production.	Negligible	Long Term	Unavoidable	Limited (small area) Regional (decreased productivity)	**LSU-1:** The Applicant would prepare a livestock management plan **LSU-2:** The Applicant would prepare a dryland farming management plan	None identified
Agriculture	Solar Arrays	Exclusionary fencing would be installed around the solar arrays. Exclusionary fencing would prevent the solar array project areas from being used for agricultural activities throughout the Project's operations stage. The loss of available farmland would result in a reduction in dryland wheat production and, potentially, a loss in grazing areas for livestock.	Low	Long Term	Unavoidable	Limited (small area) Regional (decreased productivity)	**LSU-1:** The Applicant would prepare a livestock management plan **LSU-2:** The Applicant would prepare a dryland farming management plan	None identified
Agriculture	**Comprehensive Project**	Impacts on agricultural activities from operation of the comprehensive Project would be similar to those presented for Turbine Option 1 and the solar arrays. However, when considering the impact of the comprehensive Project, the possibility for a conflict between the planned management of agricultural activities within the Lease Boundary and Project operations increases when compared with any individual component.	Low (decreased productivity) Medium (operational changes)	Long Term	Unavoidable	Limited (small area) Regional (decreased productivity)	**LSU-1:** The Applicant would prepare a livestock management plan **LSU-2:** The Applicant would prepare a dryland farming management plan	None identified

Notes:
[a] The impacts related to each component, including "comprehensive Project," were rated separately; components were combined in the same cell if they received the same impact ratings for the identified topic.
[b] Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.
[c] Mitigation measures listed here are additional actions that EFSEC could impose to further reduce the impacts. See Section 4.1 Introduction for details.
[d] Significant unavoidable impacts are those that would remain even after all identified additional mitigation measures have been required by EFSEC.
ASC = Application for Site Certification; BESS = battery energy storage system; EFSEC = Washington Energy Site Evaluation Council

Table 4.8-6c: Summary of Potential Impacts on Land and Shoreline Use during Decommissioning of the Proposed Action

Topic	Component[a]	Description of Impact[b]	Magnitude of Impact: • Negligible • Low • Medium • High	Duration of Impact: • Temporary • Short Term • Long Term • Constant	Likelihood of Impact: • Unlikely • Feasible • Probable • Unavoidable	Spatial Extent or Setting of Impact: • Limited • Confined • Local • Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Agriculture	Turbine Option 1 Turbine Option 2 BESSs Substations	Similar to the construction stage	Negligible (farm plan modifications) Low (decrease productivity)	Temporary (brief access modifications) Short Term (seasonal restrictions	Unavoidable	Limited (small area) Regional (decreased productivity)	**LSU-1:** The Applicant would prepare a livestock management plan **LSU-2:** The Applicant would prepare a dryland farming management plan **LSU-3:** Arrange for the removal of livestock **LSU-4:** Confirm that site restoration activities are in alignment with the Applicant's decommissioning plan **LSU-5:** Requirements for requesting an alternative land use as part of decommissioning	None identified
Agriculture	Solar Arrays **Comprehensive Project**	Impacts would be less than those described for the construction stage as dryland wheat production located within the solar array project area would have previously been taken out of management.	Low	Temporary (brief access modifications) Short Term (seasonal restrictions)	Unavoidable	Limited (small area) Regional (decreased productivity)	**LSU-1:** The Applicant would prepare a livestock management plan **LSU-2:** The Applicant would prepare a dryland farming management plan **LSU-3:** Arrange for the removal of livestock **LSU-4**: Confirm that site restoration activities are in alignment with the Applicant's decommissioning plan **LSU-5:** Requirements for requesting an alternative land use as part of decommissioning	None identified

Notes:
(a) The impacts related to each component, including "comprehensive Project," were rated separately; components were combined in the same cell if they received the same impact ratings for the identified topic.
(b) Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.
(c) Mitigation measures listed here are additional actions that EFSEC could impose to further reduce the impacts. See Section 4.1 Introduction for details.
(d) Significant unavoidable impacts are those that would remain even after all identified additional mitigation measures have been required by EFSEC.
BESS = battery energy storage system

4.8.3 Impacts of No Action Alternative

Under the No Action Alternative, impacts related to land use from the construction, operation, and decommissioning of the Proposed Action would not occur. For the purpose of this analysis, it is assumed that no future development would occur within the Lease Boundary.

This Page Intentionally Left Blank

4.9 Historic and Cultural Resources

This section evaluates the impacts on historic and cultural resources within the Area of Analysis that could result from the proposed Horse Heaven Wind Farm (Project, or Proposed Action). The Area of Analysis comprises land within the Horse Heaven Wind Farm, LLC's (Applicant's) Lease Boundary totaling 72,428 acres and includes the proposed Wind Energy Micrositing Corridor of approximately 10,972 acres (of predominantly linear features, including the turbines, support infrastructure, etc.) and the Solar Siting Areas, which encompass approximately 10,755 acres (Horse Heaven Wind Farm, LLC 2021). The historic and cultural resources considered as part of this assessment include archaeological resources, historic archaeological resources, architectural resources, and traditional cultural properties (TCPs), as identified in Section 3.9.

Under the Washington State Environmental Policy Act (SEPA), this Draft Environmental Impact Statement (EIS) weighs the likelihood of occurrence with the severity of an impact (Washington Administrative Code [WAC] 197-11-794) and considers several factors when evaluating potential impacts (WAC 197-11-330 and WAC 197-11-794). These impacts were qualitatively assessed based on the method of analysis described in Section 4.9.1 below. Additionally, the qualitative evaluation presented herein relies on the impact scale defined in Section 4.1 and summarized in **Table 4.9-1**. Although the use of the impact scale and a qualitative assessment of impacts is not typical for historic and cultural resources, this Draft EIS is intended to comply with SEPA requirements.

4.9.1 Method of Analysis

Potential impacts on historic and cultural resources are considered during the following Project stages:

- Project construction
- Project operation
- Project decommissioning

The Project includes several subcomponents—wind turbines, solar arrays, and battery energy storage systems (BESS) and associated substations—each has been assessed separately as described below.

- **Wind Turbines.** For the wind turbine portion of the Project, the Applicant is considering multiple turbine sites. The information provided by the Applicant to date, it is expected that the impacts to historic and cultural resources will be similar for Turbine Option 1 and Turbine Option 2, though it is recognized that some proposed turbine locations may be more sensitive to impact than others. For this reason, Turbine Options 1 and 2 were assessed the same with the assumption of the highest potential impact from either option. As the final Project design and layout are still under development, potential impacts are considered to occur throughout the Micrositing Corridor.
- **Solar Arrays.** Three Solar Siting Areas are considered for the proposed placement of the solar arrays:
  - East Solar / Bofer Canyon
  - West Solar 1 / County Well Road
  - West Solar 2 / Sellards Road

  At this stage of the Project design, and to aid future refinement, impacts are considered to occur throughout these defined areas (rather than in discrete portions of each area).

- **BESSs and Associated Substations.** The substations and BESSs are adjacent components at three locations:
  - HH-East Substation
  - HH-West Step-up Substation (primary)
  - HH-West Step-up Substation (alternate)

  Due to their adjacency, the impacts of the substations and BESSs on historic and cultural resources are assessed together for each Project stage. There are two more substations, without supporting BESSs, whose impacts are assessed individually:
  - HH-West Intermediate Substation (primary)
  - HH-West Intermediate Substation (alternate)

This evaluation of potential interactions between Project components and activities and the historic and cultural resources in the Area of Analysis relies primarily on information provided in the Application for Site Certification (ASC) for the Project (Horse Heaven Wind Farm, LLC 2021) and Chapter 2.1 of this Draft EIS. Information on the National Register of Historic Places (NRHP) eligibility of cultural resources located in the Project Lease Boundary vicinity was gathered during archaeological surveys conducted by the Applicant's archaeological consultant, Historical Research Associates, Inc.

The qualitative evaluation presented herein relies on the impact scale defined in Section 4.1 and shown in **Table 4.9-1**. The impact scale was developed for this Draft EIS, and it is not based on a published source. The impact scale provides a standardized approach to assess significant impacts across all resource topics for the Project. The following was developed to assist the Washington Energy Facility Site Evaluation Council (EFSEC) in their determination of significance and to contextualize the impact scale within state cultural resource laws (Revised Code of Washington [RCW] 27.53) and SEPA rules (WAC 197-11-080).

Impact ratings were assessed conservatively due to the nature of historic and cultural resources, which are finite and irreplaceable. In addition, eligibility for listing in the NRHP is unevaluated for a majority of the historic and cultural resources in the Area of Analysis. The conservative approach to impact ratings conforms with WAC 197-11-080 (SEPA rules: Incomplete or unavailable information), which stipulates that if information on significant adverse impacts is unavailable, the lead agency under SEPA shall proceed with a worst-case analysis.

Table 4.9-1: Impact Rating Scale from Section 4.1

Factor	Rating →			
Magnitude	**Negligible** indistinguishable from the background	**Low** small impact, non-sensitive receptor(s)	**Medium** intermediate impact, may occur on sensitive receptor(s) or affect public health and safety	**High** large impact on sensitive receptor(s) or affecting public health and safety
Duration	**Temporary** infrequently during any stage	**Short Term** duration of construction or site restoration	**Long Term** during operation or operation plus another stage of Project	**Constant** during life of Project and/or beyond the Project
Likelihood	**Unlikely** not expected to occur	**Feasible** may occur	**Probable** expected to occur	**Unavoidable** inevitable
Spatial Extent/Setting	**Limited** small area of Lease Boundary or beyond Lease Boundary if duration is temporary	**Confined** within Lease Boundary	**Local** beyond Lease Boundary to neighboring receptors	**Regional** beyond neighboring receptors

The qualitative rating system described in Section 4.1 was used to assess the extent of Project-related impacts on historic and cultural resources according to the following attributes:

- **Magnitude** – Would the impact result in a direct or indirect alteration to the characteristics that would qualify the resource for inclusion in the NRHP? What is the resource sensitivity? Are Project-related impacts on historic and cultural resources negligible, low, medium, or high in terms of their severity?
- **Duration** – Is the impact temporary, short term, long term, or constant? Some impacts (e.g., removal or destruction) on resources would be irreversible and therefore, in this analysis, constant.
- **Likelihood** – Are the potential impacts on cultural resources unlikely, feasible, probable, or inevitable? When the intent of the Applicant's Avoidance and Protection Plan (APP) is to avoid the identified resource, likelihood is assessed as unlikely. If there is the potential for the environmental setting of a culturally sensitive resource to be adversely affected (e.g., noise, vibration, and visual interferences) regardless of avoidance through the Applicant's APP, the likelihood will be assessed as appropriate.
- **Spatial Extent** – Are impacts potentially confined to a small area (i.e., a single archaeological resource), or do they extend beyond the local area to viewsheds beyond the Lease Boundary?

As identified in **Table 4.9-2**, the determination of impact magnitude is based on adverse effects on the integrity of cultural and historic resources and their resource sensitivity.

Table 4.9-2: Criteria for Assessing Magnitude of Impacts on Cultural and Historic Resources

Magnitude of Impacts	Description
Negligible	**Adverse Effects:** No adverse effects on impacted resources. **Resource sensitivity:** Impacted resources are fully evaluated and not eligible for NRHP listing.
Low	**Adverse Effects:** Adverse effects on impacted resources are deemed unlikely, pending DAHP concurrence on eligibility recommendations. **Resource sensitivity:** Impacted resources are recommended not eligible for NRHP listing but further evaluation may be required.
Medium	**Adverse Effects:** Potential for adverse effects on impacted resources. **Resource sensitivity:** Impacted resources are unevaluated for the NRHP.
High	**Adverse Effects:** Adverse effects on impacted resources. **Resource sensitivity:** Impacted resources are either unknown; eligible or potentially eligible for the NRHP; or Yakama Nation-requested avoidance of precontact isolates, regardless of eligibility (Barney 2021) .

DAHP = Washington State Department of Archaeology and Historic Preservation; NRHP = National Register of Historic Places; Yakama Nation = Confederated Tribes and Bands of the Yakama Nation

To help determine the magnitude of potential impacts resulting from the proposed Project, consideration was given to adverse effects and the resource sensitivity of a cultural resource. Adverse effects considers whether an impact results in a direct or indirect alteration to the characteristics that would qualify the resource for inclusion in the NRHP. This assessment considers all potential impacts, in line with guidance provided by the Advisory Council on Historic Properties (2019), including:

- Direct Effects: Impacts that result from an immediate interaction between a planned Project activity and the receiving receptors, free from extraneous influence, (i.e., partial or complete destruction of an archaeological feature or cultural site, changes to viewshed, or loss of access to TCPs).
- Indirect Effects: Impacts that are secondary, occurring later in time or farther from the activity causing the interaction (i.e., mitigation measures installed for a different impact affecting cultural resources).

Resource sensitivity is based on NRHP eligibility, listing, and discussions with Tribes.[24] Resource sensitivity has been considered even when the intent of the Applicant's APP is to avoid the identified resource. For the intent of this analysis, the resource sensitivity of a given historic or cultural resource escalated in rating based on whether:

- Impacts on historic and cultural resources that are fully evaluated and not eligible for the NRHP fit the criteria for negligible magnitude.
- Impacts on resources that have been partially evaluated and recommended not eligible for NRHP listing but may require further evaluation fit the criteria for low magnitude.
- Impacts on archaeological resources that are unevaluated for inclusion in the NRHP fit the criteria for medium magnitude. Unevaluated archaeological resources are protected by RCW 27.53, regardless of NRHP

[24] The use of "Tribes" in this context is inclusive of the Confederated Tribes and Bands of the Yakama Nation, Confederated Tribes of the Umatilla Indian Reservation, Nez Perce Tribe, and Wanapum Tribe.

eligibility, requiring a permit from the Washington State Department of Archaeology and Historic Preservation (DAHP)25 prior to working within the boundaries of those sites.

- Impacts on unknown resources, resources that are evaluated as either eligible or potentially eligible for the NRHP, or resources the Tribes have requested avoidance of regardless of NRHP eligibility, have an elevated resource sensitivity and fit the criteria for high magnitude.

For projects that do not involve any federal decisions or lands, precontact archaeological sites do not need to be evaluated for NRHP eligibility, and historic isolates are, by definition, not NRHP-eligible (Hanson 2021). Regardless, precontact resources, regardless of significance, are protected under RCW 27.53 and require a permit to disturb. DAHP, however, only issues permits for archaeological sites and does not issue permits for isolates, provided the isolated nature of the find has been confirmed through additional evaluation. However, precontact isolates have an elevated resource sensitivity, because the Confederated Tribes and Bands of the Yakama Nation (Yakama Nation) has requested avoidance, and therefore, resources are provided a high magnitude rating in this analysis.

In terms of significant adverse impacts on historic and cultural resources, the worst-case scenario would be the loss of unknown resources because such resources cannot be moved, reproduced, or replaced. Unknown resources have an elevated resource sensitivity, and therefore a high magnitude rating, due to the potential severity of their loss. To conform with the conservative approach required by WAC 197-11-080, all TCPs have a high magnitude rating because information on these resources is incomplete, unavailable, or confidential and the potential for significant impacts on these resources is unknown, requiring a worst-case analysis.[26]

4.9.2 Impacts of Proposed Action

4.9.2.1 Impacts during Construction

Turbine Options 1 and 2

Impacts on historic and cultural resources from the construction of turbines and associated supporting infrastructure would occur within the Micrositing Corridor. Impacts include those that may result in the damage of an identified resource, most likely through ground-invasive activities and direct disturbance, including:

- Surface grading
- Surface clearance
- Construction of access roads, turnaround areas, and laydown areas
- Construction of tower foundations
- Construction of supporting infrastructure (e.g., meteorological stations, transformers, and underground cables)

[25] RCW 27.53

[26] Continued conversations with affected Tribes (Confederated Tribes and Bands of the Yakama Nation, Confederated Tribes of the Umatilla Indian Reservation, Nez Perce Tribe, and Wanapum Tribe) could provide more detailed information about potential significant impacts on TCPs. Ongoing engagement regarding potential significant impacts may provide mitigation measures to employ for TCPs. The impact significance rating may change as a result of continued Tribal engagement.

Impacts also include those resulting from noise, vibration, and visual interferences as a result of the construction activities associated with the development of Turbine Option 1 or Turbine Option 2. These impacts could adversely affect the environmental setting by diminishing the “sense of place” and the integrity of TCPs and/or result in a loss of local access to a TCP. Consequently, the use of historic and cultural resources, including TCPs within the Micrositing Corridor and the wider Project viewshed, could be adversely impacted. Activities during construction of the turbines that may result in these impacts include:

- Restricted access to TCPs (associated with fencing and land acquisition)
- Noise impacts from construction traffic
- Dust impacts from construction traffic
- Vegetation clearance
- Visual impacts, including viewsheds (beyond the Lease Boundary)

Throughout the Micrositing Corridor, there are 24 known cultural resources that occur within the proposed turbine construction area, including 19 archaeological resources and five historic period architectural resources, one of which is a combined architectural and archaeological resource.

Discussions with the affected Tribes have identified TCPs within or near the Micrositing Corridor (Section 3.9). The Applicant has agreed to implement an APP and an Inadvertent Discovery Plan (IDP) for the Project to avoid or reduce any potential impacts on cultural resources. The implementation of these measures during the construction stage is considered in the assessment of Project-related impacts, as an Applicant commitment.

Of the 19 archaeological resources within the Micrositing Corridor, four are precontact-period resources:

- **45BN2092**
- **45BN261**
- **45BN2090**
- **45BN2153** (precontact component)

Resource **45BN2092** is a confirmed isolate, with radial shovel probes yielding no further archaeological information (Davis, Tuck, et al. 2021). As a confirmed isolate, resource **45BN2092** is not protected by RCW 27.53, and any potential for disturbance will not require a permit from DAHP; however, the Yakama Nation has requested avoidance of precontact isolates (Barney 2021). If resource **45BN2092** cannot be avoided, consultation with interested Tribes and DAHP is recommended.

The remaining precontact-period resources are unevaluated and are protected by RCW 27.53. Additionally, the affected Tribes have indicated that site **45BN261** is culturally sensitive. A permit from DAHP would be required prior to working within the boundaries of the referenced precontact resources. It is anticipated that the successful implementation of the APP would result in avoidance of the resource through the establishment of construction limits within the Micrositing Corridor. As a result of avoiding the resource, the construction of the turbines is not anticipated to directly damage or alter the identified precontact resources.

To acknowledge the Yakama Nation’s request of avoidance, a magnitude of high has been assessed for precontact resources. Adverse impacts on the environmental setting of the precontact resources are anticipated and include noise, vibration, and visual interferences. The likelihood of adverse impacts on these resources within the Micrositing Corridor is unlikely, affecting multiple confined sites within the Lease Boundary, and would be constant throughout the life of the Project.

Six of the archaeological resources in the Micrositing Corridor are historic period isolates—e.g., single pieces of farming equipment (e.g., **45BN2081**) or fragmented glass or stoneware vessels (e.g., **45BN2163**, **45BN2091**). These resources were evaluated as not eligible for listing on the NRHP (avoidance is therefore not required by DAHP). They are considered to have limited research and/or contextual value and integrity. Construction-stage impacts on these resources will therefore be negligible in magnitude (i.e., the partial or complete loss of resources that are of limited historical value). The likelihood of impacts on these resources within the Micrositing Corridor is probable, affecting multiple confined sites within the Lease Boundary, and would be constant (e.g., irreversible) in nature.

Finally, eight of the archaeological resources (**45BN2151**, **45BN2152**, **45BN2085**, **45BN2086**, **45BN2148** [archaeological component], **45BN2087**, **45BN2088**, and **45BN2089**) in the Micrositing Corridor are unevaluated historic-period sites that cannot be evaluated for listing in the NRHP without further subsurface archaeological investigation to determine their eligibility. On a conservative basis, these unevaluated sites are potentially eligible for listing, requiring a medium magnitude rating. Assuming the successful implementation of the APP to demarcate and thereby avoid impacts in the Micrositing Corridor, construction of the turbines is considered unlikely to result in impacts to the multiple confined sites, but if impacts were to occur, they would be constant (e.g., irreversible) in nature.

Three architectural resources within the Micrositing Corridor—another transmission line (**721665**), a roadway, and **45BN2148**—are evaluated as not eligible for listing on the NRHP. It is understood that the Applicant proposes an access road and underground collector line to cross underneath the transmission line and roadway (with no impacts predicted to the structures themselves). Any impacts on the resources would be negligible in magnitude since they are evaluated as not eligible for listing in the NRHP; furthermore, the structures themselves would remain intact. The impacts to these resources would be short term in duration, local to the sites of the resources, and probable with the current site plan.

The two remaining historic-period architectural resources—an electricity transmission line, resource **721666** (detailed in Section 3.9) and a grain elevator—are eligible for listing under the NRHP. Any impacts on these resources would be high in magnitude since they are evaluated as eligible for listing in the NRHP. Some local, short term, unavoidable impacts are anticipated to occur on the environmental setting of the resources, through the alteration of the viewshed, though the integrity and context of location would remain (with no impacts occurring to the structures themselves).

There is potential for unknown resources that were previously unidentified during the pedestrian field survey of the Micrositing Corridor (as described in Section 3.9) to be impacted during turbine construction. The application of the IDP as presented in Section 4.9.3 would apply in this situation. Given the conservative approach of this analysis, any impacts would be high in magnitude, constant in duration, and feasible in terms of their likelihood. Spatial extent is assumed to be local because unknown resources adjacent to the proposed Lease Boundary could undergo impacts on environmental setting.

Representatives from the affected Tribes contacted for the Project indicated that there are, or are likely to be, TCPs and/or historic properties of religious and cultural importance or value within the vicinity of the Project (see Section 3.9). Not all of the locations in relation to these TCPs have been disclosed, though generally sensitive areas have been identified during engagement (CTUIR 2021a; Yakama Nation 2021). During construction of turbines, temporary loss of access to TCPs for affected Tribes that may be present within the Micrositing Corridor may occur. Impacts from changes in local environmental setting include noise or air quality from construction traffic. Impacts may also be felt beyond TCPs within or adjacent to the Lease Boundary, affecting places of significance beyond the Micrositing Corridor during turbine construction. On a conservative basis, impacts on TCPs would be high in magnitude, constant (i.e., the partial or complete damage to, or loss of), probable due to known TCPs within the Lease Boundary, and regional in spatial extent. The potential magnitude of impacts on TCPs may be clarified through ongoing communication with affected Tribes.

A summary of potential impacts on historic and cultural resources during turbine construction is presented in **Table 4.9-3**.

Table 4.9-3: Potential Impacts from Turbine Construction / Micrositing Corridor

Resource Sensitivity	Resource Type	Site Number	Potential Impact	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional
Unevaluated or Not Eligible Precontact Isolates and Sites	Archaeological Resources	▪ 45BN2092 ▪ 45BN2153 (precontact component) Precontact Sites ▪ 45BN261 ▪ 45BN2090	Resources to be avoided through application of the APP. Adverse impacts on the environmental setting of the resources (including noise, vibration, and visual interferences) could occur.	High	Constant	Unlikely	Confined
Not Eligible Historic Period Isolates	Archaeological Resources	▪ 45BN2163 ▪ 45BN2081 ▪ 45BN2082 ▪ 45BN2083 ▪ 45BN2084 ▪ 45BN2091	Impacts resulting in the partial or complete loss of resources of limited historical value.	Negligible	Constant	Probable	Confined

Table 4.9-3: Potential Impacts from Turbine Construction / Micrositing Corridor

Resource Sensitivity	Resource Type	Site Number	Potential Impact	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional
Unevaluated Historic Period Sites	Archaeological Resources	▪ 45BN2153 (historic component) ▪ 45BN2151 ▪ 45BN2152 ▪ 45BN2085 ▪ 45BN2086 ▪ 45BN2148 (archaeological component) ▪ 45BN2087 ▪ 45BN2088 ▪ 45BN2089	Resources to be avoided through application of the APP. Adverse impacts on the environmental setting of the resources (including noise, vibration, and visual interferences) could occur.	Medium	Constant	Unlikely	Confined
Not Eligible Architectural Resources	Architectural Resources	▪ Transmission Line 721665 ▪ Roadway 667765 ▪ 45BN2148	Impacts on environmental setting of resources (e.g., visual).	Negligible	Short Term	Probable	Local
Eligible Architectural Resources	Architectural Resources	▪ Transmission Line 721666 ▪ Grain Elevator 722995	Impacts on environmental setting of resources (e.g., visual).	High	Short Term	Unavoidable	Local

Table 4.9-3: Potential Impacts from Turbine Construction / Micrositing Corridor

Resource Sensitivity	Resource Type	Site Number	Potential Impact	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional
Unknown Archaeological Resources and Architectural Resources	Archaeological Resources and Architectural Resources	▪ Unknown/ Unidentified Historic and Cultural Resources	Impacts potentially resulting in the partial or complete loss of resources with elevated resource sensitivity.	High	Constant	Feasible	Local
Traditional Cultural Properties	Traditional Cultural Properties	▪ Places of cultural, religious and historical significance ▪ Burial sites Ancestral burial grounds ▪ First foods locations ▪ Viewsheds Cultural landscapes and trails	Impacts resulting in the partial or complete loss of sensitive resources or loss of access to resources. Adverse impacts on the environmental setting of the resources are anticipated and include noise, vibration, and visual interferences.	High	Constant	Probable	Regional

Solar Arrays

The solar arrays are proposed over three Solar Siting Areas. The Project activities pertaining to each area are similar, though the resources impacted vary according to each field area, as detailed in **Table 4.9-4**.

Impacts on historic and cultural resources from the construction of the solar arrays and associated supporting infrastructure would occur within the confined Solar Siting Areas. Impacts from the solar siting construction activities would be limited in nature, though some invasive activities are predicted, likely related to disturbance associated with construction of the solar tracking system, including:

- Surface leveling and clearance
- Construction of access roads, turnaround areas, and laydown areas
- Construction of the solar tracking system, supporting subsurface cables and connections

Noise, vibration, and visual impacts from activities associated with construction of the solar arrays are also predicted. Any impacts on the environmental setting and, consequently, use of identified cultural resources, including TCPs, would be limited to sites within and near the proposed Solar Siting Areas. These impacts may include:

- Visual impacts during the construction of solar modules
- Noise impacts from construction traffic
- Dust impacts from construction traffic
- Vegetation clearance impacting environmental setting (e.g., sense of place)
- Loss of site access (construction of security fencing enclosing Solar Siting Area)

There are 23 resources that could be impacted by solar array construction within these (combined) Solar Siting Areas. These include both archaeological resources present on the surface and those that may be directly associated with subsurface materials and architectural resources.

East Solar Area

In the East Solar Area, there are 11 resources that could be impacted by the proposed construction activities, such as clearance and leveling to facilitate the solar siting.

This includes five historic sites that are currently unevaluated, and potentially eligible, for listing in the NRHP. On a conservative basis, these sites are potentially eligible for listing, and, assuming the successful implementation of the APP to demarcate and avoid impacts on these resources, impacts during the construction of the solar arrays would have a medium magnitude and be constant, confined, and unlikely.

Two historic period isolates (**45BN2138** and **45BN2155**) and two historic period sites (**45BN2139** and **45BN2156**) are evaluated as not eligible for listing on the NRHP. Any impacts on the resources would be negligible in magnitude since they are evaluated as not eligible for listing in the NRHP and be constant, confined, and probable.

One of the historic-period architectural resources, an electricity transmission line, resource **721666** (detailed in Section 3.9), is eligible for listing under the NRHP Multiple Property Documentation for the Bonneville Power

Administration Transmission System. Any impacts on the resource would be high in magnitude since it is evaluated as eligible for listing in the NRHP. Unavoidable, local, and short term impacts are anticipated to occur on the environmental setting of the resource, through the alteration of the viewshed. However, the integrity and context of location would remain, with no impacts occurring on the transmission line itself.

The remaining architectural resource within the Solar Siting Area, another transmission line (**721665**), is evaluated as not eligible for listing in the NRHP. Any impacts on the resource would be negligible in magnitude since it is evaluated as not eligible for listing in the NRHP, probable, short term, and local; furthermore, the line itself would remain intact with the same start and end points, continuing as a functioning part of the Bonneville Power Administration Transmission System throughout the turbine construction stage.

West Solar Area 1

In the West Solar Area 1, there are seven resources that could be impacted by construction of the solar arrays, such as clearance and leveling to facilitate the solar siting.

Resource **45BN2146** is a confirmed precontact isolate, with radial shovel probes yielding no further archaeological information. As a confirmed isolate, resource **45BN2146** is not protected by RCW 27.53, and any potential for disturbance will not require a permit from DAHP; however, the Yakama Nation has requested avoidance of precontact isolates (Barney 2021). Furthermore, if resource **45BN2146** cannot be avoided, consultation with interested Tribes (and DAHP) is recommended. To acknowledge the Yakama Nation's request of avoidance, a magnitude of high has been assessed for precontact resources. Adverse impacts on the environmental setting of the precontact resource are unlikely with the successful implementation of the APP. Impacts would be confined to the resource site if they did occur and would be constant (e.g., irreversible) if the resources were inadvertently destroyed.

Three unevaluated historic sites (**45BN2143**, **45BN2145**, and **45BN2149**) occur within the West Solar Area 1. On a conservative basis, these sites are potentially eligible for listing, and, assuming the successful implementation of the APP to demarcate and avoid impacts on these resources, impacts during the construction of the solar arrays would have a medium magnitude, be constant, confined, and unlikely to occur.

Two historic period isolates (**45BN2144** and **45BN2150**) are evaluated as not eligible for listing on the NRHP. Any impacts on the resources would be negligible in magnitude since they are evaluated as not eligible for listing in the NRHP, constant, probable, and confined in spatial extent.

One historic architectural site (a farmstead with multiple DAHP Property IDs) was evaluated and recommended as not eligible for listing in the NRHP. Without concurrence of eligibility from DAHP impacts on the **Farmstead** would be low, short term, probable, and local in spatial extent.

West Solar Area 2

In the West Solar Area 2, there are five resources that could be impacted by construction of the solar arrays, such as clearance and leveling to facilitate the solar siting. This includes five historic sites that have not been evaluated, and are potentially eligible, for listing in the NRHP. On a conservative basis, these sites are potentially eligible for listing, and, assuming the successful implementation of the APP to demarcate and avoid impacts on these resources, impacts during the construction of the solar arrays would have a medium magnitude, be constant, confined, and unlikely to occur.

All Solar Siting Areas

It is assumed that the successful implementation of the APP would establish limits of construction around potentially sensitive resources within the Solar Siting Areas. As the resources would be avoided by construction activities, impacts on known and sensitive resources within the solar arrays is unlikely.

There is potential for unknown resources previously unidentified during the pedestrian field survey of the Solar Siting Areas to be disturbed during construction of the solar arrays. The IDP (see Section 4.9.3) would apply in this context. Given the conservative approach taken in this analysis, impacts on unknown resources would be high in magnitude, feasible, constant, and local in spatial extent.

Representatives from the affected Tribes have indicated that there are, or are likely to be, TCPs and/or historic properties of religious and cultural significance within the vicinity of the Project (see Section 3.9). Not all of the locations in relation to these TCPs have been disclosed, though generally sensitive areas have been identified during engagement (CTUIR 2021a; Yakama Nation 2021), and the affected Tribes have identified an impact related to culturally sensitive sites, as discussed previously. In general, the locations of TCPs are not yet well understood, and culturally sensitive areas within the Lease Boundary have been highlighted as significant by the Tribes. These site locations have not yet been fully disclosed.

Impacts on the environmental setting and, consequently, continued use of identified architectural and cultural resources, including TCPs, would be limited to sites within and near the proposed Solar Siting Areas. This includes the transmission line (**721666)**, which crosses the Solar East area and is evaluated as eligible for listing on the NRHP. impacts on the environmental setting of the resources are expected through the alteration of the viewshed, though the integrity and context of location would remain (with no impacts occurring on the transmission line itself).

During the construction stage, the erection of fencing enclosing Solar Siting Areas may result in the loss of access for Tribes to any TCPs that may be present within these spaces.[27] Some impacts may be felt beyond TCPs themselves (i.e., changes in air quality, visual impacts, affecting viewsheds beyond the proposed solar areas) these impacts would be local in extent.

On a conservative basis, prior to the refinement of the Project’s design, and without careful planning and mitigation, construction of the solar arrays may result in impacts on TCPs (whose locations are not yet fully understood) that are high in magnitude. The likelihood of these potential impacts on any TCP within the Solar Siting Areas is probable, regional, and would be constant (e.g., irreversible) in nature.

A summary of potential impacts on historic and cultural resources during construction of the solar arrays, prior to the implementation of mitigation, is presented in **Table 4.9-4**.

[27] While loss of access during construction is a temporary impact, long-term impacts are considered during the Project’s operational stage.

Table 4.9-4: Potential Impacts – Solar Array Construction

Resource Sensitivity	Resource Type	Site Number	Potential Impact	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional
East Solar							
Unevaluated Historic Period Sites	Archaeological Resources	▪ 45BN205 ▪ 45BN2140 ▪ 45BN2141 ▪ 45BN2142 ▪ 45BN2154	Resources to be avoided through application of the APP. Adverse impacts on the environmental setting of the resources (including noise, vibration, and visual interferences) could occur.	Medium	Constant	Unlikely	Confined
Not Eligible Historic Period Isolates	Archaeological Resources	▪ 45BN2138 ▪ 45BN2155 Historic Period Sites ▪ 45BN2139 ▪ 45BN2156	Impacts resulting in the partial or complete loss of non-sensitive resources of limited historical value.	Negligible	Constant	Probable	Confined
Eligible Architectural Resources	Architectural Resources	▪ Transmission Line 721666	Impacts on environmental setting—visual, air quality, and noise—may occur.	High	Short Term	Unavoidable	Local

Table 4.9-4: Potential Impacts – Solar Array Construction

Resource Sensitivity	Resource Type	Site Number	Potential Impact	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional
Not Eligible Architectural Resources	Architectural Resources	▪ Transmission Line 721665	Impacts on environmental setting—visual, air quality and noise may occur.	Negligible	Short Term	Probable	Local
West Solar 1							
Not Eligible Precontact Isolate	Archaeological Resources	▪ 45BN2146	Resources to be avoided through application of the APP. Adverse impacts on the environmental setting of the resources (including noise, vibration, and visual interferences) could occur.	High	Constant	Unlikely	Confined
Unevaluated Historic Period Sites	Archaeological Resources	▪ 45BN2143 ▪ 45BN2145 ▪ 45BN2149	Resources to be avoided through application of the APP.	Medium	Constant	Unlikely	Confined

Table 4.9-4: Potential Impacts – Solar Array Construction

Resource Sensitivity	Resource Type	Site Number	Potential Impact	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional
Not Eligible Historic Period Isolates	Archaeological Resources	▪ 45BN2144 ▪ 45BN2150	Impacts resulting in the partial or complete loss of non-sensitive resources of limited historical value.	Negligible	Constant	Probable	Confined
Evaluated, Recommended Not Eligible Architectural Resources	Architectural Resources	▪ Farmstead 724939 through 724942	Impacts on environmental setting—visual, air quality and noise—may occur.	Low	Short Term	Probable	Local
West Solar 2							
Unevaluated Historic Period Sites	Archaeological Resources	▪ 45BN2147 ▪ 45BN2159 ▪ 45BN2160 ▪ 45BN2161 ▪ 45BN2162	Resources to be avoided through application of the APP. Impacts on environmental setting—visual, air quality, and noise—may occur.	Medium	Constant	Unlikely	Confined

Table 4.9-4: Potential Impacts – Solar Array Construction

Resource Sensitivity	Resource Type	Site Number	Potential Impact	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional
All Solar Siting Areas							
Unknown Archaeological Resources and Architectural Resources	Archaeological Resources and Architectural Resources	▪ Unknown/unidentified historic and cultural resources.	Impacts resulting in the partial or complete loss of sensitive resources.	High	Constant	Feasible	Local
Traditional Cultural Properties	Traditional Cultural Properties	▪ Places of cultural, religious and historical significance ▪ Burial sites ▪ Ancestral burial grounds ▪ First Foods locations ▪ Viewsheds ▪ Cultural landscapes and trails	Impacts resulting in the partial or complete loss of sensitive resources or loss of access to resources. Impacts on environmental setting—visual, air quality, and noise—may occur.	High	Constant	Probable	Regional

Battery Energy Storage System

Each BESS is a standard-size shipping container, placed on a concrete slab adjacent to the proposed substation, with the area enclosed by a security fence. Impacts on historic and cultural resources from the construction of the substations and associated supporting infrastructure would occur within the confined/fenced area. The activities that would impact historic and cultural resources would include the following:

- Surface clearance and grading
- Installation of underground cables/grid connections

Noise, vibration, and visual impacts from activities associated with construction of the BESSs would be limited. Any impacts on the environmental setting and, consequently, continued use of identified architectural and cultural resources, including TCPs, would be limited to sites within and near the proposed BESS. The impacts during construction of the BESSs may include:

- Visual impacts from changes to the landscape and sense of place
- Noise and dust impacts from construction traffic
- Grading/vegetation clearance impacting environmental setting (e.g., sense of place)
- Loss of site access (construction of security fencing enclosing siting area)
- Two historic-period archaeological sites are recorded near the BESS associated with the HH-West Step-up Substation (alternate) location. These are sites of debris scatter (**45BN2157** and **45BN2158**), which are unevaluated for listing on the NRHP. On a conservative basis, these sites are potentially eligible for listing requiring a medium magnitude rating, and, assuming the successful implementation of the APP to demarcate and avoid impacts on these resources located within the proposed BESS footprint, impacts during the construction of the BESS are unlikely and confined spatially, but would be constant were they to occur. There is potential for unknown resources previously unidentified during the pedestrian field survey of the proposed BESS footprints to be disturbed during construction of the BESS. Implementation of the IDP described in Section 4.9.3 would apply for this situation. Given the conservative approach of this analysis, impacts on unknown resources would be high in magnitude, feasible, constant, and local.
- Representatives from affected Tribes have indicated that there are, or are likely to be, TCPs and/or historic properties of religious and cultural significance within the vicinity of the Project (see Section 3.9). Not all of the locations in relation to these TCPs have been disclosed, though generally sensitive areas have been identified during consultation (CTUIR 2021a; Yakama Nation 2021). In general, the locations of TCPs are not yet well understood; furthermore, culturally sensitive sites within the Lease Boundary have been highlighted as significant by the Tribes. These site locations have not yet been disclosed.
- During the BESS construction stage, the erection of security fencing enclosing footprints may result in the temporary loss of access[28] to any TCPs for Tribes that may be present within these Project areas. Some impacts may also be experienced beyond TCPs themselves. They could occur as a result of visual impacts that affect viewsheds beyond the proposed solar areas. Additionally, impacts on air quality near the TCPs from fugitive dust could also occur during construction. On a conservative basis, prior to the refinement of the

[28] The operations stage assessment recognizes that loss of access may continue on a long-term basis

Project's design to avoid TCPs, construction of the BESSs may result in impacts on TCPs that are high in magnitude. The high rating is because the possibility of partial or complete damage to, or loss of, highly culturally sensitive resources exists. Without incorporation of TCPs into the APP, the likelihood of impacts on any TCP within the BESS areas is rated as probable, potentially regionally affecting multiple sites within the Lease Boundary or adjacent to the Lease Boundary and would be constant (irreversible) in nature.

- A summary of potential impacts on historic and cultural resources during construction of the BESSs, prior to the implementation of mitigation recommendations, is presented in **Table 4.9-5**.

Table 4.9-5: Potential Impacts – BESS Construction

Resource Sensitivity	Resource Type	Site Number	Potential Impact	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional
BESS							
Unevaluated Historic Period Sites	Archaeological Resources	▪ 45BN2157 ▪ 45BN2158	Resources to be avoided through application of the APP. Impacts on environmental setting—visual, air quality, and noise—may occur.	Medium	Constant	Unlikely	Confined
Unknown Archaeological Resources and Architectural Resources	Archaeological Resources and Architectural Resources	▪ Unknown/ Unidentified Historic and Cultural Resources.	Impacts resulting in the partial or complete loss of sensitive resources.	High	Constant	Feasible	Local

Table 4.9-5: Potential Impacts – BESS Construction

Resource Sensitivity	Resource Type	Site Number	Potential Impact	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional
Traditional Cultural Properties	Traditional Cultural Properties	▪ Places of cultural, religious and historical significance ▪ Burial sites Ancestral burial grounds ▪ First Foods locations ▪ Viewsheds ▪ Cultural landscapes and trails	Impacts resulting in the partial or complete loss of sensitive resources or loss of access to resources. **Impacts on environmental setting—visual, air quality, and noise—may occur.**	High	Constant	Probable	Regional

APP = Avoidance and Protection Plan

Substations

The substations include a confined 4-acre site, which would be graded and covered with a crushed rock surface, adjacent to the proposed BESS. Impacts on historic and cultural resources from the construction of the substations and associated supporting infrastructure would occur or be experienced within the confined/fenced area. The activities that would impact historic and cultural resources would include the following:

- Surface clearance and grading
- Installation of underground cables/grid connections

Noise, vibration, and visual impacts from activities associated with construction of the substations are considered limited. Any impacts on the environmental setting and, consequently, use of identified architectural and cultural resources, including TCPs, would be limited to sites within and near the proposed substation locations. These impacts during construction of substations may include:

- Visual impacts from changes to the landscape and sense of place
- Noise and dust impacts from construction traffic
- Grading/vegetation clearance impacting environmental setting (e.g., sense of place)
- Loss of site access (construction of security fencing enclosing siting area)

No archaeological or architectural resources have been identified in proximity to the HH-East Substation, HH-West Step-up Substation (primary), or HH-West Intermediate Substation location.

Two historic-period archaeological sites are recorded in proximity to the HH-West Step-up Substation (alternate) location, where both substation and BESS components are proposed. These are sites of debris scatter; site **45BN2157** is within the proposed substation footprint, and **45BN2158** is within approximately 164 feet (50 meters). Neither site has been evaluated for listing on the NRHP. One resource, **45BN2093**, is identified within the footprint of the HH-West Intermediate Substation (alternate) site; this resource is a historic-period site, also unevaluated.

Impacts in the vicinity of these three resources, as a result of ground-disturbance activities during construction of the substation components, would be mitigated through application of the APP and communication with the Tribes regarding TCPs. On a conservative basis, these sites are potentially eligible for listing requiring a medium magnitude rating, and, assuming the successful implementation of the APP to demarcate and avoid impacts on these resources confined within the proposed footprint, impacts during the construction of the substations are unlikely, but would be constant if they were to occur.

There is potential for unknown resources previously unidentified during the pedestrian field survey of the proposed disturbance footprint to be disturbed during construction of the substation components. Implementation of the IDP as described in Section 4.9.3would apply in this situation. Given the conservative approach of this analysis, impacts on unknown resources would be high in magnitude, feasible, local, and constant.

Representatives from affected Tribes have indicated that there are, or are likely to be, TCPs and/or historic properties of religious and cultural significance within the vicinity of the Project (see Section 3.9). Not all of the locations in relation to these TCPs have been disclosed, though generally sensitive areas have been identified during consultation (CTUIR 2021a; Yakama Nation 2021), and the affected Tribes have identified an impact related to a culturally sensitive site, as discussed previously. In general, the locations of TCPs are not yet well understood. Furthermore, culturally sensitive sites within the Lease Boundary have been highlighted as significant by the Tribes. These site locations have not yet been disclosed. On a conservative basis, prior to the refinement of the Project's design to avoid TCPs, construction of the substations may result in impacts on TCPs that are high in magnitude. The high rating is because the possibility of partial or complete damage to, or loss of, highly culturally sensitive resources exists.

During the construction stage,[29] the erection of security fencing enclosing the substation footprint may result in the temporary loss of access for Tribes to any TCPs that may be present within these Project areas. Some impacts may also be experienced beyond TCPs themselves. They could occur as a result of visual impacts that affect viewsheds beyond the proposed solar areas. Additionally, impacts on air quality near the TCPs from fugitive dust could also occur during construction. Without incorporation of TCPs into the APP, the likelihood of these impacts (on any TCPs within the substation areas) is rated as probable, potentially affecting multiple sites within or adjacent to the Lease Boundary, and would be constant (e.g., irreversible) in nature.

A summary of potential impacts on historic and cultural resources during construction of the substations, prior to the implementation of mitigation recommendations, is presented in **Table 4.9-6**.

[29] The operation stage assessment recognizes that loss of access may continue on a long-term basis.

Table 4.9-6: Potential Impacts – Substation Construction

Resource Sensitivity	Resource Type	Site Number	Potential Impact	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional
Substation Alternates							
Unevaluated Historic Period Sites	Archaeological Resources	▪ 45BN2157 ▪ 45BN2158 ▪ 45BN2093	Resources to be avoided through application of the APP. Impacts on environmental setting—visual, air quality and noise may occur.	Medium	Constant	Unlikely	Confined
Unknown Archaeological Resources and Architectural Resources	Archaeological Resources and Architectural Resources	▪ Unknown/ Unidentified Historic and Cultural Resources.	Impacts resulting in the partial or complete loss of sensitive resources.	High	Constant	Feasible	Local

Table 4.9-6: Potential Impacts – Substation Construction

Resource Sensitivity	Resource Type	Site Number	Potential Impact	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional
Traditional Cultural Properties	Traditional Cultural Properties	▪ Places of cultural, religious and historical significance ▪ Burial sites Ancestral burial grounds ▪ First Foods locations ▪ Viewsheds ▪ Cultural landscapes and trails	Impacts resulting in the partial or complete loss of resources or loss of access. Impacts on environmental setting—visual, air quality and noise.	High	Constant	Probable	Regional

APP = Avoidance and Protection Plan

Comprehensive Project

As described above in detail, the construction of the entire Project could result in the following potential impacts on historic and cultural resources:

- Surface grading
- Surface clearance
- Construction of access roads, turnaround areas, and laydown areas
- Construction components and supporting infrastructure
- Restricted access to TCPs (associated with fencing and land acquisition)
- Noise impacts from construction traffic
- Dust impacts from construction traffic
- Vegetation clearance
- Visual impacts, including viewsheds (beyond the Lease Boundary)

These impacts may result in the following consequences:

- Partial or complete loss of non-sensitive resources of limited historical value
- Partial or complete loss of unknown/unidentified archaeological or architectural resources
- Changes to the environmental setting of architectural resources
- Partial or complete loss of unknown/unidentified TCPs
- Changes to the environmental setting of TCPs
- Changes to the current access of TCPs

The successful implementation of the APP will ensure the avoidance of impacts on known, sensitive archaeological and historic resources, including those that are eligible, or potentially eligible, for NRHP listing. Construction of the comprehensive Project is predicted, on a worst-case basis, to have a combined impact on historic and cultural resources that is constant (e.g., irreversible), resulting in the partial or complete loss of resources. The magnitude of this impact will vary according to adverse impacts and resource sensitivity. Where resources are currently unevaluated prior to the implementation of mitigation measures, these impacts would be feasible, and they would be confined to a specific site (and receptor location).

Representatives from the affected Tribes have indicated that there are, or are likely to be, TCPs and/or historic properties of religious and cultural significance within the vicinity of the Project, and these locations have not yet been fully disclosed. On a conservative basis, prior to the refinement of the Project’s design, and without careful planning and mitigation, construction of the comprehensive Project may result in impacts on TCPs that are high in magnitude. The likelihood of these potential impacts is probable, possibly affecting multiple sites within or adjacent to the Lease Boundary and would be constant in nature.

Impacts on the environmental setting and, consequently, continued use of identified architectural and cultural resources, including TCPs, would be limited to sites within and near the proposed development areas. Some limited, short term impacts are anticipated, though the integrity of these locations would remain.

The erection of fencing during development of the comprehensive Project may result in the temporary loss of access for Tribes to any TCPs that may be present. On a conservative basis, these impacts would be potentially high in magnitude, short term (during construction), and limited to confined areas within the Lease Boundary. Some impacts may, however, be felt beyond TCPs themselves (i.e., visual impacts, affecting viewsheds) and be “local” in extent. Where cumulative impacts on TCPs from changes in air quality (i.e., dust from construction traffic) could occur; these impacts would be short term, high in magnitude, and local in extent. A summary of potential impacts on historic and cultural resources during construction of the comprehensive Project, prior to the implementation of mitigation recommendations, is presented in **Table 4.9-7**.

Table 4.9-7: Potential Impacts – Comprehensive Project: Construction

Resource Sensitivity	Resource Type	Site Number	Impact	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional
Unevaluated Archaeological Resources	Archaeological Resources	Unevaluated Precontact or Historic period resources	Resources to be avoided through application of the APP.	Medium	Constant	Unlikely	Confined
Not Eligible Archaeological Resources	Archaeological Resources	Resources evaluated as not eligible	Impacts resulting in the partial or complete loss of non-sensitive resources of limited historical value.	Negligible	Constant	Probable	Confined
Eligible Archaeological Resources	Archaeological Resources	Resources Evaluated as Eligible	Impacts resulting in the partial or complete loss of resources with an elevated resource sensitivity.	High	Constant	Feasible	Confined
Unknown Archaeological Resources and Architectural Resources	Archaeological Resources and Architectural Resources	Unknown/Unidentified Historic and Cultural Resources	Impacts resulting in the partial or complete loss of resources with an elevated resource sensitivity.	High	Constant	Feasible	Local

Table 4.9-7: Potential Impacts – Comprehensive Project: Construction

Resource Sensitivity	Resource Type	Site Number	Impact	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional
Not Eligible Architectural Resources	Architectural Resources	Evaluated as not eligible	Impacts resulting in the partial or complete loss of non-sensitive resources of limited historical value. Impacts on environmental setting—visual, air quality and noise.	Negligible	Short Term	Probable	Local
Eligible Architectural Resources	Architectural Resources	Evaluated as eligible	Impacts on environmental setting—visual, air quality and noise.	High	Short Term	Probable	Local
Traditional Cultural Properties	Traditional Cultural Properties	Places of cultural, religious, and historical significance; burial sites or ancestral burial grounds; First Foods locations	Impacts resulting in the partial or complete loss of resources.	High	Constant	Probable	Regional

Table 4.9-7: Potential Impacts – Comprehensive Project: Construction

Resource Sensitivity	Resource Type	Site Number	Impact	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional
Traditional Cultural Properties	Traditional Cultural Properties	Places of cultural, religious, and historical significance; viewsheds; cultural landscapes and trails	Impacts on environmental setting – visual, air quality, noise, and loss of access.	High	Long Term	Probable	Regional

APP = Avoidance and Protection Plan

4.9.2.2 Impacts during Operation

The operations stage of the Project is not anticipated to involve additional ground-disturbing activity; as a consequence, no further physical impacts on historic cultural resources are predicted. Therefore, impacts during operation of the comprehensive Project are analyzed rather than separate analysis of individual components.

Comprehensive Project

Irreversible losses identified under construction, as described above, would persist through the operations stage. Impacts during the operations stage would involve disturbances primarily as a result of changes to the local visual setting, ambient noise levels, and continued loss of access to TCPs if present. These impacts may include:

- Visual impacts of multiple operating turbines, solar arrays, substations, and BESSs
- Noise and dust impacts from maintenance vehicles
- Loss of site access (construction of security fencing)

Historic and cultural resources that may continue to be impacted during the operations stage, prior to implementation of mitigation measures to reduce these impacts, are:

- Architectural resources eligible or potentially eligible for NRHP listing
- TCPs

There is a single identified architectural resource, the transmission line (**721666**), that crosses the Micrositing Corridor and Solar East area, evaluated as eligible for listing on the NRHP. Operation of the Project is expected to impact this resource due to vehicular traffic and visual changes. These impacts would be constant but high in magnitude, with the function and integrity of the resource remaining intact throughout the defined stage.

Impacts on the environmental setting and wider cultural landscape through visual changes during the operational stage of wind and solar projects are subjective and are discussed in more detail in Section 4.10. In the case of the Project, the visual impact of multiple operating turbines may have a high (adverse) impact on the sense of place of cultural landscapes both within and beyond the Lease Boundary, affecting distant viewsheds (toward and across the Lease Boundary), linkages between TCPs, and the immediate confines of a specific TCP site and its unique sociocultural setting.

During the operation stage, the continuation of fencing enclosing the Solar Siting Areas, BESS and substation locations, and turbine maintenance roads may result in loss of access for Tribes to any specific TCPs that may be present within these spaces, thus resulting in the fragmentation of the wider cultural landscape. On a conservative basis, these impacts on TCPs would be potentially high in magnitude and long term in duration, affecting confined, multiple areas within the Lease Boundary and places beyond and across the wider landscape. Impacts on TCPs from changes in air quality from fugitive dust created by maintenance vehicles could also occur, and these impacts would be high and localized. As shown in Section 4.3, traffic emissions themselves are not expected to result in adverse impacts on ambient air quality levels.

A summary of potential impacts on historic and cultural resources during the operation stage of the Project, and prior to the implementation of mitigation recommendations, is presented in **Table 4.9-8**.

Table 4.9-8: Potential Impacts: All Project Components: Operation

Resource Sensitivity	Resource Type	Site Number	Impact	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional
Eligible Architectural Resources	Architectural Resources	▪ Transmission Line 721666	Impacts on environmental setting—visual, air quality and noise.	High	Constant	Unavoidable	Local
Traditional Cultural Properties	Traditional Cultural Properties	▪ Places of cultural, religious and historical significance	Impacts on environmental setting – visual, air quality, noise, and loss of access.	High	Constant	Probable	Regional
Unknown Archaeological Resources and Architectural Resources	Archaeological Resources and Architectural Resources	Unknown/ Unidentified Historic and Cultural Resources	Impacts resulting in the partial or complete loss of resources with an elevated resource sensitivity.	High	Constant	Feasible	Local

4.9.2.3 Impacts during Decommissioning

Comprehensive Project

Decommissioning activities are assumed to involve the removal of most of the Project's aboveground structures to allow site redevelopment or restoration. As no additional ground disturbance would occur beyond that carried out for construction, any unanticipated discovery of architectural, archaeological, or cultural resources during decommissioning of the Project is unlikely. It is also expected that no impacts on the environmental setting would occur for any identified resources beyond those previously identified for the operation stage of the Project; restrictions in access would cease upon completion of the decommissioning stage. A summary of potential impacts on historic and cultural resources during the operation stage of the Project, and prior to the implementation of mitigation recommendations, is presented in **Table 4.9-9**.

Table 4.9-9: Potential Impacts: Comprehensive Project: Decommissioning

Resource Sensitivity	Resource Type	Site Number	Impact	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional
Eligible Architectural resources	Architectural resources	▪ Transmission Line 721666	Impacts on environmental setting—visual, air quality and noise.	High	Short Term	Probable	Local
Traditional Cultural Properties	Traditional Cultural Properties	▪ Places of cultural, religious and historical significance	Impacts on environmental setting—visual, air quality, noise, and loss of access.	High	Short Term	Probable	Regional
Unknown Archaeological Resources and Architectural Resources	Archaeological Resources and Architectural Resources	▪ Unknown/ Unidentified Historic and Cultural Resources	Impacts resulting in the partial or complete loss of sensitive resources.	High	Constant	Unlikely	Local

4.9.3 Applicant Commitments and Identified Mitigation

This section describes measures that would reduce or compensate for impacts related to cultural and historic resources from construction, operation, and decommissioning of the Project. These measures would be implemented in addition to compliance with the environmental permits, plans, and authorizations required for the Proposed Action.

Applicant Commitments

The Applicant has identified measures and/or best practices that are designed to prevent or minimize impacts on the affected environment for the Project. Measures presented by the Applicant in the ASC (Horse Heaven Wind Farm, LLC 2021) and taken into consideration in the characterization of potential impacts on cultural and historic resources are discussed in Section 2.3 and summarized below.

Avoiding impacts on significant archaeological resources and burial sites is the preferred course of action, in accordance with state law. RCW 27.44 and RCW 27.53.060 require permits from DAHP before excavating, removing, or altering Native American human remains or archaeological resources in Washington.

- **Avoidance and Protection Plan for Cultural Resources**

  To mitigate impacts on known cultural resources that may potentially be impacted by the Project, the Applicant has agreed to implement an APP that provides specific measures for sensitive resources. The APP would include constraints mapping to inform the engineering team of archaeological sensitivities to be avoided as the Project design is refined. Specifically, it would include commitments for the demarcation of sensitive resources via staking/flagging prior to and during the construction stage for all Project components. To preserve confidentiality of the resource locations, all site markings would be removed following the construction stage.

  If a resource cannot be avoided, a qualified archaeologist will develop additional archaeological investigation measures and/or additional mitigation in coordination with DAHP and the Tribes, as appropriate. It should be noted that an Archaeological Excavation and Removal Permit (per RCW 27.53.060) is required for alterations to any precontact archaeological site. For historic-era archaeological sites, permits are only required for removal or excavation of those that are eligible for, or listed on, the NRHP. The APP would include commitments to Tribal representatives, who would be invited to monitor any ground works in sensitive areas during the construction stage.

  Furthermore, the APP would detail the size of avoidance buffers at each resource based on the site type, landform, and the potential for buried deposits. These buffers would be determined following review of the preferred micro-alignment, within the Micrositing Corridor, Solar Siting Areas, and substation and BESS sites as appropriate. For the precontact resources, a buffer has already been implemented, consisting of a 66-foot (20-meter) area around the two sites (**45BN261** and **45BN2090**) and a 33-foot (10-meter) area around the two isolates (**45BN2092** and **45BN2146**) and multicomponent site (**45BN2153**). If, given other siting constraints, it is not possible to avoid significant impacts on historic and cultural resources, other measures may be considered in participation with DAHP and affected Tribes.

- **Cultural Resources Education and Training**

  To prevent or minimize impacts on cultural resources, a qualified archaeologist would be retained by the Applicant to provide a cultural resource briefing during on-site induction, for all site-based staff that includes all applicable laws and penalties pertaining to disturbing cultural resources. The details of the briefing will be developed by the Proponent and EFSEC with participation from other stakeholders and would include, at a minimum:

- A summary of the regional context and archaeological sensitivity of the area
- The types of cultural resources that may be present, instruction for Project workers to halt their work if a cultural resource is inadvertently discovered during ground-disturbing activities
- The procedures to follow in the event of an inadvertent discovery (as outlined below for the IDP)
- Guidance on appropriate treatment and respectful behavior (e.g., no photographs or posting to social media).

A local Tribal representative(s) would be invited to participate in the briefing to provide context from a Tribal perspective regarding the cultural resources within the Lease Boundary (and wider region as appropriate).

- **Inadvertent Discovery Plan**

To mitigate any accidental impacts on previously unidentified resources, a qualified archaeologist would prepare an IDP prior to ground-disturbing activities during the Project's construction stage. The IDP would be used for the lifetime of the Project. Should archaeological resources be accidentally discovered during Project activities, all activity in the vicinity of the find would stop and a qualified archaeologist would be contacted to assess the significance according to NRHP criteria as applicable. If any find is determined to be significant, the archaeologist would coordinate with the implementing agencies, Washington Department of Natural Resources (where appropriate), and affected Tribes to formulate appropriate avoidance measures or other appropriate mitigation.

If a resource could not be avoided, a qualified archaeologist would develop additional archaeological investigation measures, such as data recovery, in coordination with the implementing agency, DAHP, and appropriate Tribal representatives. If evidence of human burials is encountered, all ground-disturbing activity in the vicinity would be halted immediately. DAHP, Benton County Planning and Community Development Department, Benton County Sheriff's Office, the Applicant, and Tribes would be notified immediately. No work would resume within a 98-foot (30-meter) radius until all appropriate approvals had been received.

Recommended Mitigation Measures

EFSEC has identified the following additional and modified mitigation measures for the Project to minimize impacts on cultural resources that could be required by EFSEC, but may also involve the participation of other parties. The following mitigation is not considered fully effective when part of the measure requires cooperation by a third party which EFSEC cannot require. EFSEC would work with the identified parties to facilitate cooperation in implementing this mitigation measure. Additional analysis required for Historic and Cultural Resources is explained further in ES-4 Key Issues and Issues to be Resolved.

CR-1: Traditional Cultural Properties Mitigation

Ongoing engagement with affected Tribes is recommended to facilitate the locations of TCPs, to better quantify and mitigate any potential impacts on them. Tribal review of site/engineering plans would provide input to guide design and avoidance, without confidential disclosure of locations. This engagement should also include opportunities to evaluate the effectiveness of any implemented mitigation measures throughout the Project's lifecycle. Appropriate mitigation measures may include (but are not limited to) the demarcation of "no-go," culturally sensitive areas to be avoided by contractors through Project redesign and/or refinement and/or the maintenance of safe access to TCPs and/or other places of cultural significance. If appropriate, the implementation of environmental enhancement measures (e.g., planting and/or screening) or the protection of certain aspects of the environmental setting, may be considered in participation with affected groups. The CTUIR (2021a, 2021b) proposed several mitigation strategies. Potential mitigation strategies include:

- Enabling continued access for Tribes through an Access Agreement (e.g., continued access to First Foods)
- Create protections for natural resources that support First Foods procurement (e.g., preserve landforms, practice responsible stream management, avoid negative impacts on pollinator species)
- Off-site mitigation, including education and outreach work, to assist Tribes in the perpetuation of oral history and legends that would have been taught in-situ in the Area of Analysis. Engagement with Tribes on appropriate rehabilitation (closure) strategies for the safeguarding of viewshed and cultural landscapes
- Tribal representatives to be included during any ground-disturbing activities (Cultural Resource Monitor)
- Develop an agreement with the Tribes in anticipation of a time when the wind farm would be considered for disassembly to restore the landscape and viewshed

CR-2: Archaeological and Architectural Resources Mitigation.

Table 4.9-10 sets out proposed mitigation measures for archaeological and architectural resources potentially impacted by the Project. Any mitigation strategies should be detailed in an agreement document between EFSEC, DAHP, the Tribes, and the Project proponent.

Recommended mitigation measures are intended to minimize impacts on cultural resources with high sensitivity (unevaluated resources, precontact isolates, precontact sites, historic archaeological resources, and TCPs), primarily through avoidance. If avoidance is not possible, the recommended mitigation clarifies which resources would require a DAHP permit prior to disturbance. Recommended mitigation measures also identify instances where engagement with DAHP, Tribes, and/or landowners would be warranted.

Table 4.9-10: Summary of Recommendations for Archaeological and Architectural Resources Potentially Impacted by the Project

Resource ID	Resource Type	Eligibility for Protection/Listing (NRHP)	Recommendations
▪ 45BN2092 ▪ 45BN2146	Archaeological Resources (Precontact Isolates)	Confirmed isolates, not protected by RCW 27.53	▪ Any potential disturbance will not require a DAHP permit. ▪ Avoidance, through successful implementation of the APP preferred. ▪ In the event that the resources cannot be avoided. Further engagement with Tribes, DAHP, and landowners recommended.

Table 4.9-10: Summary of Recommendations for Archaeological and Architectural Resources Potentially Impacted by the Project

Resource ID	Resource Type	Eligibility for Protection/Listing (NRHP)	Recommendations
▪ 45BN261 ▪ 45BN2090 ▪ 45BN2153 (precontact component)	Archaeological Resources (Precontact Archaeological Sites)	Protected by RCW 27.53	▪ Avoidance, through implementation of the APP. ▪ In the event resources cannot be avoided, a DAHP permit must be obtained to disturb them. ▪ In the event that the resources cannot be avoided. Further engagement with Tribes, DAHP, and landowners recommended.
▪ 45BN2081 ▪ 45BN2082 ▪ 45BN2083 ▪ 45BN2084 ▪ 45BN2091 ▪ 45BN2138 ▪ 45BN2144 ▪ 45BN2150 ▪ 45BN2155 ▪ 45BN2163	Archaeological Resources (Historic Isolates)	Not eligible for NRHP listing	▪ Negligible predicted impacts on resources. ▪ Avoidance not required. ▪ No further measures are recommended.
▪ 45BN2139 ▪ 45BN2156	Archaeological Resource (Historic Sites)	Not eligible for NRHP listing	▪ Negligible predicted impacts on resources. ▪ Avoidance not required. ▪ No further measures are recommended.

Table 4.9-10: Summary of Recommendations for Archaeological and Architectural Resources Potentially Impacted by the Project

Resource ID	Resource Type	Eligibility for Protection/Listing (NRHP)	Recommendations
▪ 45BN205 ▪ 45BN2085 ▪ 45BN2086 ▪ 45BN2087 ▪ 45BN2088 ▪ 45BN2089 ▪ 45BN2093 ▪ 45BN2140 ▪ 45BN2141 ▪ 45BN2142 ▪ 45BN2143 ▪ 45BN2145 ▪ 45BN2147 ▪ 45BN2148 ▪ 45BN2149 ▪ 45BN2151 ▪ 45BN2152 ▪ 45BN2153 (historic component) ▪ 45BN2154 ▪ 45BN2157 ▪ 45BN2158 ▪ 45BN2159 ▪ 45BN2160 ▪ 45BN2161 ▪ 45BN2162	Archaeological Resources (Historic Sites)	Unevaluated (potentially eligible for NRHP listing)	▪ Avoidance, through implementation of the APP. ▪ In the event resources cannot be avoided, the sites should be evaluated for their significance and eligibility for listing, with next steps determined in conjunction with DAHP.
▪ Farmstead ▪ Transmission Line 721665 ▪ 3152-S4 ▪ Roadway 667765	Architectural Resources	Evaluated as not eligible for NRHP listing	▪ Negligible predicted impacts on resources. ▪ Avoidance not required. ▪ No further measures are recommended.
▪ Transmission Line 721666 ▪ Grain Elevator 722995	Architectural Resources	Eligible for listing in the NRHP	▪ High predicted impacts. ▪ Avoidance required. ▪ No further measures are recommended.

Notes:
APP = Avoidance and Protection Plan; DAHP = Washington State Department of Archaeology and Historic Preservation; NRHP = National Register of Historic Places; RCW = Revised Code of Washington

4.9.3.1 Significant Unavoidable Adverse Impacts

Determining the significance of an impact involves context and intensity, which, in turn depend on the magnitude and duration of an impact. “Significant” in SEPA means a reasonable likelihood of more than a moderate adverse impact on environmental quality. An impact may also be significant if its chance of occurrence is not great, but the resulting environmental impact would be severe if it occurred (WAC 197-11-794).

This Draft EIS weighs the impacts on historic and cultural resources that may result from the proposed Project with mitigation and makes a resulting determination of significance for each impact in **Tables 4.9-11a, 4.9-11b, and 4.9-11c**.

This Page Intentionally Left Blank

Table 4.9-11a: Summary of Potential Impacts on Historic and Cultural Resources during Construction of the Proposed Action

Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Not Eligible Archaeological Historic Period Isolates and Sites	Turbine Option 1 Turbine Option 2 Solar Arrays **Comprehensive Project**	Impacts resulting in the partial or complete loss of non-sensitive resources of limited historical value.	Negligible	Constant	Probable	Confined	**CR-2:** Archaeological and Architectural Resources Mitigation	None identified
Unevaluated Archaeological Historic Period Isolates and Sites	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Resources to be avoided through application of the APP. Without evaluation, magnitude of impact is medium but is unlikely to occur due to the APP. Potential for the unplanned and accidental loss of unevaluated resources.	Medium	Constant	Unlikely	Confined	**CR-2:** Archaeological and Architectural Resources Mitigation	None identified
Not Eligible or Unevaluated Archaeological Precontact Period Isolates and Sites	Turbine Option 1 Turbine Option 2 **Comprehensive Project**	Resources to be avoided through application of the APP. Impacts on environmental setting—visual, air quality and noise may occur.	High	Constant	Unlikely	Confined	**CR-2:** Archaeological and Architectural Resources Mitigation	Significant for partial or complete loss of archaeological isolates. However, discussions with affected Tribes and DAHP could provide more detailed information about the impacts and potential mitigation. This may change the impact significance rating.
Not Eligible Architectural Resources	Turbine Option 1 Turbine Option 2 Solar Arrays **Comprehensive Project**	Impacts resulting in the partial or complete loss of non-sensitive resources of limited historical value. Impacts on environmental setting of resources (visual etc.).	Negligible	Short Term	Probable	Local	**CR-2:** Archaeological and Architectural Resources Mitigation	None identified
Eligible Architectural Resources	Turbine Option 1 Turbine Option 2 Solar Arrays **Comprehensive Project**	Impacts on environmental setting of resources (visual etc.).	High	Short Term	Unavoidable	Local	**CR-2:** Archaeological and Architectural Resources Mitigation	None identified
Evaluated, Recommended Not Eligible Architectural Resources	Solar Arrays	Impacts resulting in the partial or complete loss of non-sensitive resources believed to be of limited historical value. Impacts on environmental setting – visual, air quality, and noise.	Low	Short Term	Probable	Local	**CR-2:** Archaeological and Architectural Resources Mitigation	None identified

Table 4.9-11a: Summary of Potential Impacts on Historic and Cultural Resources during Construction of the Proposed Action

Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Unknown/ Unidentified/Unevaluated Historic and Cultural Resources	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Impacts potentially resulting in the partial or complete loss of significant resources that are unknown, unidentified, or unevaluated for the NRHP.	High	Constant	Feasible	Local	**CR-2:** Archaeological and Architectural Resources Mitigation	None identified
Traditional Cultural Properties	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Impacts resulting in the partial or complete loss of resources. Impacts on environmental setting - inability to view cultural landscapes.	High	Constant	Probable	Regional	**CR-1:** Traditional Cultural Properties Mitigation	Significant for partial or complete loss of traditional cultural properties and resources. However, discussions with affected Tribes could provide more detailed information about the impacts and potential mitigation. This may change the impact significance rating.

Notes:
[a] The impacts related to each component, including “comprehensive Project,” were rated separately; components were combined in the same cell if they received the same impact ratings for the identified topic.
[b] Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.
[c] Mitigation measures listed here are additional actions that EFSEC could impose to further reduce the impacts. See Section 4.1, Introduction for details.
[d] Significant unavoidable impacts are those that would remain even after all identified additional mitigation measures have been required by EFSEC.
BESS= battery energy storage system; EFSEC = Washington Energy Facility Site Evaluation Council; NRHP = National Register of Historic Places; Tribes = Confederated Tribes and Bands of the Yakama Nation, Confederated Tribes of the Umatilla Indian Reservation, Nez Perce Tribe, and Wanapum Tribe

Table 4.9-11b: Summary of Potential Impacts on Historic and Cultural Resources during Operation of the Proposed Action

Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Eligible Architectural Resources	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Impacts on environmental setting—visual, air quality and noise.	High	Constant	Unavoidable	Local	**CR-2:** Archaeological and Architectural Resources Mitigation	None identified
Traditional Cultural Properties	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Impacts on environmental setting – visual, air quality, noise, and loss of access.	High	Constant	Probable	Regional	**CR-1:** Traditional Cultural Properties Mitigation	Significant for partial or complete loss of traditional cultural properties and resources. However, discussions with affected Tribes could provide more detailed information about the impacts and potential mitigation. This may change the impact significance rating.
Unknown/ Unidentified Historic and Cultural Resources	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Impacts potentially resulting in the partial or complete loss of significant (previously unidentified) resources.	High	Constant	Feasible	Local	**CR-2:** Archaeological and Architectural Resources Mitigation	None identified

Notes:

(a) The impacts related to each component, including "comprehensive Project," were rated separately; components were combined in the same cell if they received the same impact ratings for the identified topic.
(b) Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.
(c) Mitigation measures listed here are additional actions that EFSEC could impose to further reduce the impacts. See Section 4.1, Introduction for details.
(d) Significant unavoidable impacts are those that would remain even after all identified additional mitigation measures have been required by EFSEC.

BESS= battery energy storage system; EFSEC = Washington Energy Facility Site Evaluation Council

Table 4.9-11c: Summary of Potential Impacts on Historic and Cultural Resources during Decommissioning of the Proposed Action

Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Eligible Architectural Resources	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Impacts on environmental setting—visual, air quality and noise.	High	Short Term	Probable	Local	**CR-2:** Archaeological and Architectural Resources Mitigation	None identified
Traditional Cultural Properties	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Impacts on environmental setting – visual, air quality, noise, and loss of access.	High	Short Term	Probable	Regional	**CR-1:** Traditional Cultural Properties Mitigation	None identified
Unknown/ Unidentified Historic and Cultural Resources	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Impacts potentially resulting in the partial or complete loss of significant (previously unidentified) resources.	High	Constant	Unlikely	Local	**CR-2:** Archaeological and Architectural Resources Mitigation	None identified

Notes:
(a) The impacts related to each component including "comprehensive Project" were rated separately; components were combined in the same cell if they received the same impact ratings for the identified topic.
(b) Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.
(c) Mitigation measures listed here are additional actions that EFSEC could impose to further reduce the impacts. See Section 4.1, Introduction for details.
(d) Significant unavoidable impacts are those that would remain even after all identified additional mitigation measures have been required by EFSEC.
BESS= battery energy storage system; EFSEC = Washington Energy Facility Site Evaluation Council

4.9.4 Impacts of No Action Alternative

Under the No Action Alternative, impacts related to historical and cultural resources from the construction, operation, and decommissioning of the Proposed Action would not occur. For the purpose of this analysis, it is assumed that no future development would occur within the Lease Boundary.

This Page Intentionally Left Blank

4.10 Visual Aspects, Light and Glare

This section evaluates the visual and aesthetic impacts of the proposed Horse Heaven Wind Farm (Project, or Proposed Action) within the area of analysis for visual resources. Section 3.10 presents the affected environment for visual aspects, light and glare. The analysis area includes the key observation point (KOP) locations and residential receptors on adjacent properties and areas of dense population near the City of Kennewick, Washington, and the larger Tri-Cities urban area along the Columbia River.

In accordance with the Washington State Environmental Policy Act, this Draft Environmental Impact Statement (EIS) weighs the likelihood of occurrence with the severity of an impact (Washington Administrative Code [WAC] 197-11-794) and considers several factors when determining the significance of identified potential impacts (WAC 197-11-330 and WAC 197-11-794). The impact rating is summarized in **Table 4.10-1.**

Table 4.10-1: Impact Rating Table for Visual Aspects, Light and Glare from Section 4.1

Factor	Rating →			
Magnitude	**Negligible** indistinguishable from the background	**Low** small impact, non-sensitive receptor(s)	**Medium** intermediate impact, may occur on sensitive receptor(s) or affect public health and safety	**High** large impact on sensitive receptor(s) or affecting public health and safety
Duration	**Temporary** infrequently during any stage	**Short Term** duration of construction or site restoration	**Long Term** during operation or operation plus another stage of Project	**Constant** during life of Project and/or beyond the Project
Likelihood	**Unlikely** not expected to occur	**Feasible** may occur	**Probable** expected to occur	**Unavoidable** inevitable
Spatial Extent/Setting	**Limited** small area of Lease Boundary or beyond Lease Boundary if duration is temporary	**Confined** within Lease Boundary	**Local** beyond Lease Boundary to neighboring receptors	**Regional** beyond neighboring receptors

Background

Potential impacts from the Proposed Action are assessed for visual aspects, shadow flicker, light, and glare during the construction, operation, and decommissioning stages of the following Project components:

- Turbine Option 1 and Turbine Option 2
- Solar arrays
- Battery energy storage systems (BESSs)

- Substations and transmission lines
- Comprehensive Project

The evaluation presented herein relies on the following reports generated for the Application for Site Certification (ASC) for the Project, or subsequently provided for this Draft EIS:

- Visual Impact Assessment Report (SWCA 2022)
- ASC provided by Horse Heaven Wind Farm, LLC (Applicant) (Horse Heaven Wind Farm, LLC 2021a)
- Aesthetics Technical Memorandum for the Horse Heaven Wind Farm Project provided by Horse Heaven Wind Farm, LLC (Horse Heaven Wind Farm, LLC 2021b)
- Shadow Flicker Analysis Memorandum provided by Horse Heaven Wind Farm, LLC (Horse Heaven Wind Farm, LLC 2021c)
- Glare Analysis Report provided by the Applicant (Horse Heaven Wind Farm, LLC 2021d)

4.10.1 Method of Analysis

Anticipated visual, lighting, and glare impacts during operation of the Project were quantified and qualified using several methodologies. During construction and decommissioning stages, however, the Project would generate minimal light and glare from vehicles and equipment, and minimal work would be performed during nighttime hours, thus limiting the need for temporary nighttime lighting (Horse Heaven Wind Farm, LLC 2021d). Additionally, solar panel construction is not expected to create glare until the panels are installed; therefore, the construction impacts would be equivalent to the glare generated by the Project. For these reasons, impact analysis for lighting and glare was considered only for the operational phase of the Project. The assessment of anticipated visual effects considered impacts during the construction and decommissioning stages, as these activities would generate visual contrast with the existing setting, which would be visible from identified KOP locations.

4.10.1.1 Visual Aspects Methodology

The analysis of the Project’s visual impacts focuses on three elements: landscape character, viewing locations, and compliance with state and county visual management guidance. The analysis uses the methods developed by the Clean Energy States Alliance (CESA), which suggest three evaluation criteria as they relate to determine whether impacts rise to the magnitude of “undue” or “unreasonable” (CESA 2011):

- Does the project violate a clear written aesthetic standard intended to protect the scenic values or aesthetics of the area or a particular scenic resource?
- Does the project dominate views from highly sensitive viewing areas or within the region as a whole?
- Has the developer failed to take reasonable measures to mitigate the significant or avoidable impacts of the project?

In consideration of the methods developed by CESA and the Bureau of Land Management (BLM), **Table 4.10-2** further describes the degrees of magnitude outlined in **Table 4.10-1** (negligible, low, medium, and high) as they relate to the visual impact analysis performed for the Project. As identified in **Table 4.10-2**, the determination of impact magnitude is based on impacts on landscape character, impacts on viewing locations, and compliance with state and county visual resource requirements. These determinations are primarily informed by the concept of project contrast, which is a measure of the overall visual changes to existing features of the landscape (including landform/water, vegetation, and human-made structures) resulting from the construction, operation, and decommissioning of a project. The level of project contrast is assessed using the categories of slight, weak, moderate, and strong, which directly align with the magnitude of change degrees of negligible, low, medium, and high.

Table 4.10-2: Criteria for Assessing Magnitude of Impacts Related to Visual Aspects

Magnitude of Impacts	Description
Negligible	**Landscape character:** Landscape would appear unaltered and Project components would not attract attention. Project components would repeat form, line, color, texture, scale and/or movement common in the landscape and would not be visually evident. **Viewing locations:** Contrast introduced by the Project would be slight, subordinate to existing landscape features, and not readily seen from viewing locations. Project components would repeat elements or patterns common in the landscape. **State and county visual resource requirements:** The Project would be consistent with state and county visual management requirements.
Low	**Landscape character:** Landscape would be noticeably altered, and Project components would begin to attract attention in a partially intact visual setting. Project components would introduce form, line, color, texture, scale, and/or movement common in the landscape and would be visually subordinate (i.e., have weak contrast). **Viewing locations:** A weak level of contrast would be introduced by the Project. The Project would occupy a small portion of the viewshed and would be subordinate to existing landscape features, as seen from viewing locations. **State and county visual resource requirements:** The Project would be consistent with state and county visual management requirements after implementation of Applicant commitments.
Medium	**Landscape character:** Landscape would appear to be considerably altered, and Project components would begin to dominate a partially intact visual setting. Project components would introduce form, line, color, texture, scale, and/or movement not common in the landscape and would be visually prominent in the landscape (moderate contrast). **Viewing locations:** A moderate level of contrast would be introduced by the Project, attracting attention from viewing locations. The Project would be prominent in the existing landscape and co-dominate from viewing locations where the form, line, color, texture, scale, and/or movement of Project components would be moderately incongruent with existing landscape features. **State and county visual resource requirements:** The Project would be partially consistent with state and county visual management requirements after Applicant commitments.
High	**Landscape character:** Landscape would appear to be strongly altered, and Project components would dominate an intact visual setting. Project components would introduce form, line, color, texture, scale, and/or movement not common in the landscape and would be visually dominant in the landscape (strong contrast). **Viewing locations:** A strong level of contrast would be introduced by the Project, demanding attention. The Project would be highly prominent and dominate views from viewing locations where the form, line, color, texture, scale, and/or movement of Project components would be highly incongruent with existing landscape features, including existing structures. A strong level of contrast may also be introduced if the Project components occupy a large portion of the viewshed from a given viewpoint. **State and county visual resource requirements:** The Project would be inconsistent with state and county visual management requirements after Applicant commitments.

Source: SWCA 2022

Other concepts taken from the CESA methods were used to evaluate and address the unique visual characteristics of wind energy projects. The assessment of impacts on landscape character includes modifications to the existing setting, which may reduce the setting's overall level of intactness. With regard to impacts on views, the concepts of project dominance, prominence within the setting, and extent of viewshed occupied by the Project (i.e., extent of horizontal view occupied by Project) were included from the CESA methods. These concepts build on the BLM Visual Resource Management's 10 environmental factors that influence the amount of visual contrast introduced by a project (BLM 1986):

- Distance
- Angle of observation
- Length of time the project is in view
- Relative size or scale
- Season of use
- Lighting conditions
- Recovery time
- Spatial relationships
- Atmospheric conditions
- Motion

Of particular importance for a project with wind turbines is the influence of motion to attract attention and increase the level of visual contrast within view, compared to static elements (e.g., solar arrays, transmission lines).

To support the visual impact discussions, the following visual terminology is used in this report:

- Viewer position (angle of observation)
  - Inferior: viewer is located below the Project in elevation.
  - Level: viewer is at the same elevation as the Project.
  - Superior: viewer is located above the Project in elevation.
- Project visibility factors
  - Screening: An existing visual barrier (landforms, vegetation, or structures) blocks or limits views of the Project, reducing the level of contrast introduced by the Project.
  - Unobstructed: Views of the Project would not be screened by landforms, vegetation, or structures, allowing for the extent of the Project to be visible.
  - Skylining: The Project would appear above the horizon or ridgeline, silhouetting its form against the sky attracting additional attention in the landscape.

Since impacts on visual resources considered effects on scenery and on views from multiple KOPs, the summary impact level (i.e., magnitude of impact) at the end of each discussion focuses on the highest identified impacts. Visual impacts on cultural resources, including from the perspective of Native American tribes, are described in Section 4.9, Historic and Cultural Resources.

The maximum number of turbines and maximum turbine height carried forward for analysis as components of the Project under Turbine Option 1 and Turbine Option 2 are summarized in **Table 4.10-3**.

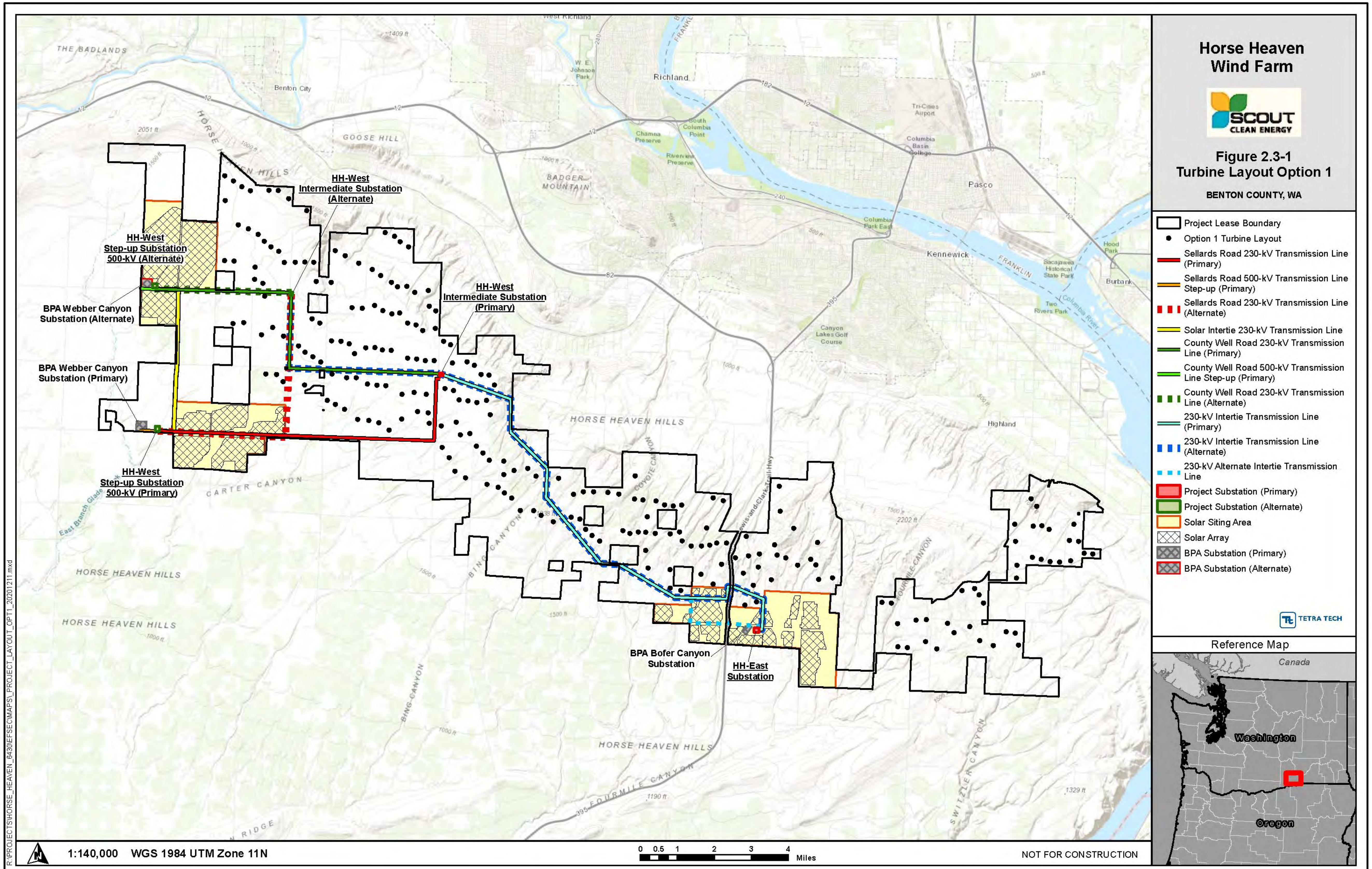
Table 4.10-3: Proposed Action Example Wind Turbine Layout and Model Options

Turbine Parameters/Features	Turbine Option 1	Turbine Option 2
Wind Turbine Output	GE 2.82-MW	GE 5.5-MW
Wind Turbine Layout	244 turbines up to a maximum blade tip height of 499 feet[(a)]	150 turbines up to a maximum blade tip height of 671 feet[(a)]
Tower Type	Tubular	Tubular
Turbine Rotor Diameter	417 feet	518 feet
Turbine Hub Height (ground to nacelle)	292 feet	411 feet
Tower Base Diameter	15.1 feet	15.1 feet

Source: Horse Heaven Wind Farm, LLC 2021a
Notes:
[(a)] As proposed in the ASC, Table 2.3-1
ASC = Application for Site Certification; GE = General Electric; MW = megawatts

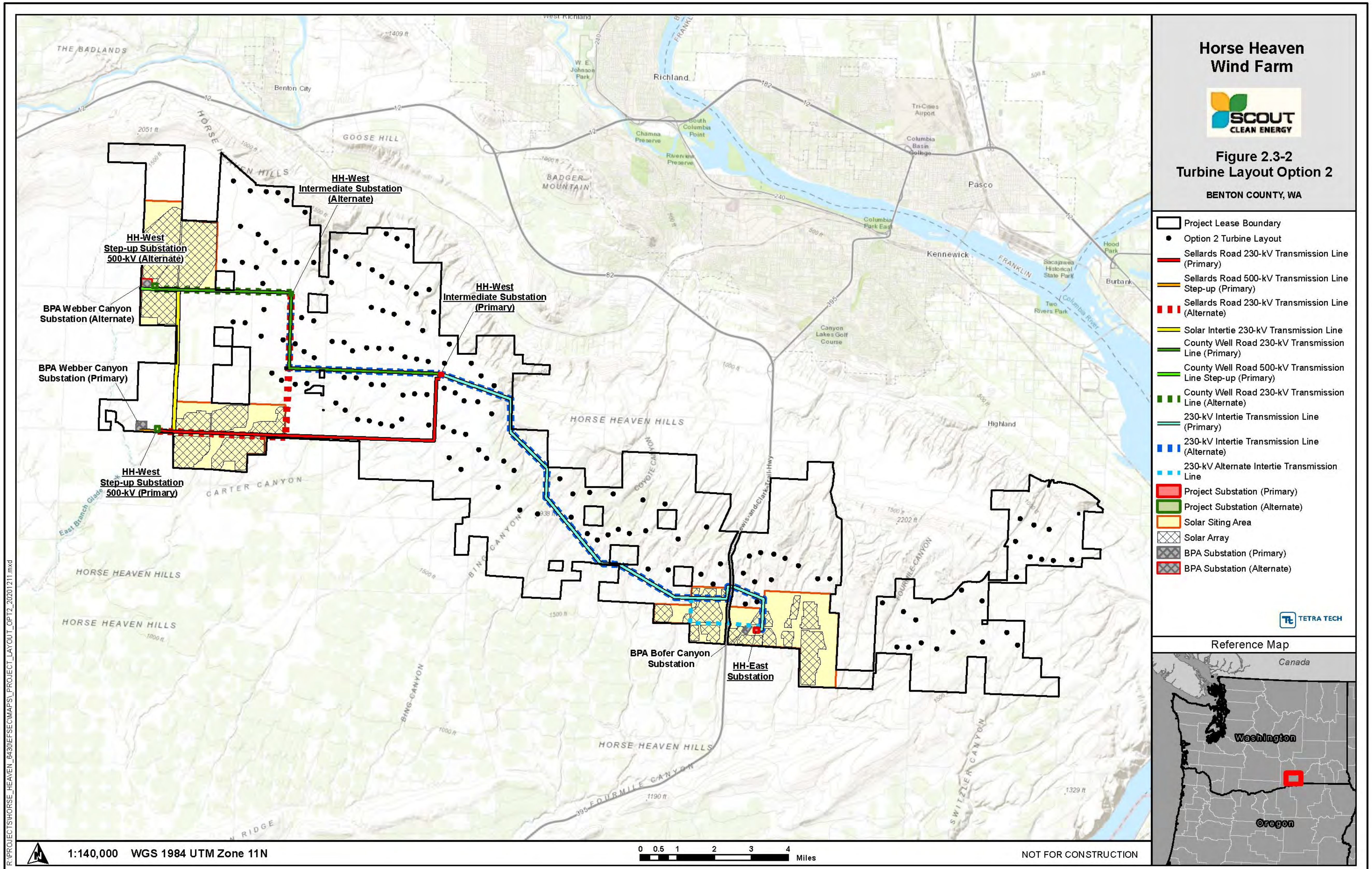
Turbine Option 1 is shown in **Figure 4.10-1**, and Turbine Option 2 is shown in **Figure 4.10-2**. The figures provide an overview of the Project vicinity and show the locations of nearby residences that are considered KOPs and receptors for light and glare analysis, as well as the visual aspect. The residential receptors are a subset of the noise sensitive receptors analyzed for the Project as part of the acoustic assessment (Section 3.11, Noise and Vibration) and retain the associated identification numbers for cross-reference. The final number of turbines and the specific model used would depend on availability and other considerations at the time of construction.

This Page Intentionally Left Blank



Source: Horse Heaven Wind Farm, LLC 2021a

Figure 4.10-1: Turbine Option 1 Layout



Source: Horse Heaven Wind Farm, LLC 2021a

Figure 4.10-2: Turbine Option 2 Layout

4.10.1.2 Shadow Flicker Methodology

An analysis of potential shadow flicker impacts from the Project was conducted using the WindPRO software package (EMD 2019). The Applicant is considering two different turbine models and two different turbine layouts, which are presented in **Table 4.10-3**, **Figure 4.10-1**, and **Figure 4.10-2**.

This WindPRO analysis calculated the total amount of time (hours and minutes per year) that shadow flicker could occur at receptors surrounding the Project's turbines. The calculations were based on the following assumptions:

- The elevation and position geometries of the terrain, turbines, and surrounding receptors were determined using U.S. Geological Survey digital elevation model data (USGS 2017). Position geometries were determined using geographic information system data referenced to Universal Transverse Mercator Zone 11 (North American Datum of 1983).
- The position of the sun and the incident sunlight relative to the turbines and receptors on a minute-by-minute basis over the course of a year.
- The historical sunshine availability (percentage of total hours available). Historical sunshine rates for the area (as summarized by the National Climatic Data Center for Spokane, Washington) used in this analysis are presented in Table 4.10-4 (NOAA 2019). For the purposes of shadow flicker analysis, Spokane sunshine rates serve as a representative data set for the Project.
- Estimated turbine operations and orientation based on on-site measured wind data, including wind speed/ wind direction frequency distribution, measured at a meteorological tower located near the center of the Project site.
- Receptor viewpoints (i.e., house windows) are assumed to always be directly facing the turbine-to-sun line of sight (i.e., "greenhouse mode").

Table 4.10-4: Historical Sunshine Availability by Month for Spokane, Washington

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
25%	37%	53%	57%	63%	65%	78%	76%	70%	54%	26%	22%

Source: Horse Heaven Wind Farm, LLC 2021c

The sun's path with respect to each turbine location is calculated by the WindPRO software to determine the cast shadow paths every minute over a full year. Since shadow flicker only occurs when at least 20 percent of the sun's disc is covered by the turbine blades, WindPRO uses blade dimension data to calculate the maximum distance from the turbine for which shadow flicker must be calculated. A conservative diameter of 558 feet was used for the maximum rotor diameter. WindPRO calculates a maximum shadow flicker impact distance of 2,041 meters. Beyond this distance, the turbine would not contribute to the shadow flicker effect. It should be noted, however, that WindPRO provides a conservative estimate of shadow flicker as it does not account for obstacles such as trees, haze, and visual obstructions (window facing, coverings) despite the likelihood of their reducing or eliminating shadow flicker impacts on receptors.

A total of 742 structures were identified as occupied or potentially occupied residences within 1.2 miles of the Project Lease Boundary. The 742 residential structures were considered to be potential shadow flicker receptors for the purpose of this analysis. A receptor in the model was defined as a 3- by 3-foot area (approximately the size of a typical window), 3 feet above ground level. Approximate eye level was set at 5 feet. The locations of all

742 shadow flicker receptors, along with the potential Project turbine locations for each turbine layout are presented in **Figure 4.10-9**.

In consideration of health impacts and industry standards, **Table 4.10-5** further describes the degrees of magnitude outlined in **Table 4.10-1** (negligible, low, medium, and high) as they relate to the light impact analysis elements that form the foundation of this assessment. As identified in **Table 4.10-5**, the determination of impact magnitude is based on flicker rates (flashes per second) and annual expected hours of exposure. The higher the flicker rate and the longer the expected hours of exposure, the greater the magnitude of impact.

Table 4.10-5: Criteria for Assessing Magnitude of Impacts from Shadow Flicker

Magnitude of Impacts	Description
Negligible	**Flicker Rates:** No flicker would be observed; therefore, the flicker rate would be zero flashes per second; -and- **Exposure:** Flicker would not be observed at these locations; therefore, zero hours of exposure.
Low	**Flicker Rates:** Flicker would be observed below 3 flashes per second at receptors; -and/or- **Exposure:** Flicker would be observed at receptors between 0 and 30 hours per year.
Medium	**Flicker Rates:** Flicker would be observed at or above 3 flashes per second at sensitive receptors; -or- **Exposure:** Flicker would be observed at sensitive receptors for 30 hours per year or more.
High	**Flicker Rates:** Flicker would be observed at or above 3 flashes per second at sensitive receptors; -and- **Exposure:** Flicker would be observed at sensitive receptors for 30 hours per year or more.

Sources: Lampeter 2011; Epilepsy Action 2018

4.10.1.3 Light Methodology

The assessment of Project-related lighting involved a review of available Project information. This information provided an estimate of the potential incremental increase in lighting that may result from the Project and would influence the current sky glow level. This incremental change, combined with assumed brightness above natural dark sky background at light receptors, was used to determine if anticipated light levels within the Project would exceed thresholds and categories for Environmental Lighting Zones (ELZ). A change in an ELZ class would signal a noticeable change in the perceived lighting conditions experienced by viewers at night.

A determination of existing light trespass, which is light or illuminance that strays from its intended purpose and potentially becomes an annoyance to nearby receptors, was qualified by assuming the amount of light trespass based on population density and surrounding land uses.

In consideration of Commission Internationale de l'Eclairage (CIE) guidelines and light trespass considerations, **Table 4.10-6** further describes the degrees of magnitude outlined in **Table 4.10-1** (negligible, low, medium, and high), as they relate to the light impact analysis elements that form the foundation of this assessment. As identified in **Table 4.10-6**, the determination of impact magnitude is based on sky glow and light trespass. These determinations are primarily informed by the brightening of the natural sky background level and the emission of light from a light source onto an adjoining property resulting from the construction, operation, and decommissioning of a project.

Table 4.10-6: Criteria for Assessing Magnitude of Impacts from Light

Magnitude of Impacts	Description
Negligible	**Light Trespass:** No observable light from the Proposed Action at off-site receptors. -and- **Sky Glow:** No degradation of sky glow.
Low	**Light Trespass:** Observable light from the Proposed Action at off-site sensitive receptors property that would not be measurable or otherwise increase lighting on that property. -and/or- **Sky Glow:** Minimal degradation of sky glow, with no change ELZ classification at non-sensitive receptors.
Medium	**Light Trespass:** Observable and measurable light from the Proposed Action at off-site dwellings. -or- **Sky Glow:** Minimal degradation of sky glow, resulting in a change ELZ classification at non-sensitive receptors.
High	**Light Trespass:** Observable and measurable light from the Proposed Action at off-site dwellings. -and- **Sky Glow:** Degradation of sky glow, resulting in a change ELZ classification at sensitive receptors.

Source: CIE 1997
ELZ = Environmental Lighting Zones

4.10.1.4 Glare Methodology

The Solar Glare Hazard Analysis Tool (SGHAT) is considered to be an industry best practice for analysis of glare related to solar energy generating facilities. Tetra Tech utilized the SGHAT technology as part of an online tool (GlareGauge) developed by Sandia National Laboratories (Sandia) and hosted by ForgeSolar. GlareGauge provides a quantitative assessment of the following (ForgeSolar 2020):

- When and where glare has the potential to occur throughout the year for a defined solar array polygon
- Potential effects on the human eye at locations where glare is predicted

The following statement was issued by Sandia regarding the SGHAT technology:

> Sandia developed SGHAT v. 3.0, a web-based tool and methodology to evaluate potential glint/glare associated with solar energy installations. The validated tool provides a quantified assessment of when and where glare will occur, as well as information about potential ocular impacts. The calculations and methods are based on analyses, test data, a database of different photovoltaic module surfaces (e.g., anti-reflective coating, texturing), and models developed over several years at Sandia. The results are presented in a simple easy-to-interpret plot that specifies when glare will occur throughout the year, with color indicating the potential ocular hazard (Sandia 2016).

Note, however, that technology changes continue to occur to address issues such as reflectivity. The model, therefore, presents a conservative assessment based on simplifying assumptions inherent in the model, as well as industry improvements since the most recent update of such assumptions. See **Appendix 4.10-1**.

Based on the predicted retinal irradiance (i.e., intensity) and subtended angle (i.e., size/distance) of the glare source to receptor, the GlareGauge categorizes potential glare where it is predicted by the model to occur in accordance with three tiers of severity (i.e., ocular hazards) that are shown by different colors in the model output:

- Red glare: glare predicted with a potential for permanent eye damage (i.e., retinal burn)
- Yellow glare: glare predicted with a potential for temporary after-image
- Green glare: glare predicted with a low potential for temporary after-image

These categories of glare are calculated using a typical observer’s blink response time, ocular transmission coefficient (i.e., the amount of radiation absorbed in the eye prior to reaching the retina), pupil diameter, and eye focal length (i.e., the distance between the retina and the place where rays intersect in the eye). As a point of comparison, direct viewing of the sun without a filter is considered to be on the border between yellow glare and red glare, while typical camera flashes are considered to be lower tier yellow glare (i.e., approximately three orders of magnitude less than direct viewing of the sun). Upon exposure to yellow glare, the observer may experience a spot in their vision temporarily lasting after the exposure. Upon exposure to green glare, the observer may experience a bright reflection but typically no spot lasting after exposure.

In consideration of Federal Aviation Administration (FAA) regulations and glare intensity outlined, **Table 4.10-7** further describes the degrees of magnitude outlined in **Table 4.10-1** (negligible, low, medium, and high), as they relate to the glare impact analysis elements that form the foundation of this assessment. As identified in **Table 4.10-7**, the determination of impact magnitude is based on impacts of glare on air travel, on road travel, and at observation points.

Table 4.10-7: Criteria for Assessing Magnitude of Impacts from Glare

Magnitude of Impacts	Description
Negligible	No potential for glare at off-site receptors or at existing or planned air traffic control tower cabs.
Low	Green glare: glare predicted with a low potential for temporary after-image at off-site receptors, at traffic control tower cabs, or along the final approach path for any existing landing threshold or future landing thresholds.
Medium	Yellow glare: glare predicted with a potential for temporary after-image at off-site receptors, at traffic control tower cabs, or along the final approach path for any existing landing threshold or future landing thresholds.
High	Red glare: glare predicted with a potential for permanent eye damage (i.e., retinal burn) at off-site receptors, at traffic control tower cabs, or along the final approach path for any existing landing threshold or future landing thresholds.

Sources: Sandia 2016; ForgeSolar 2020

4.10.1.5 Application of Impact Assessment to Project Components

The four types of potential visual or aesthetic impacts from the Proposed Action are not uniformly applicable to all Project components (for example, BESSs are not a potential source of shadow flicker). **Table 4.10-8** identifies the impact type analyzed for Project components.

Table 4.10-8: Impact Analysis Applicable to Project Component

Project Component	Visual Aspects	Shadow Flicker	Light	Glare
Turbine Option 1	A	A	A	NA
Turbine Option 2	A	A	A	NA
Solar Arrays	A	NA	A	A
Substations and Transmission Lines	A	NA	A	NA
Battery Energy Storage System	A	NA	A	NA
Comprehensive Project	A	A	A	A

Notes:
A = Potential impact type is applicable to Project component.
NA = Potential impact type is not applicable to Project component.

4.10.2 Impacts of Proposed Action

4.10.2.1 Impacts during Construction

The construction of the Project would introduce form, line, color, texture, scale, light, glare, and movement inconsistent with the existing landscape character and would modify views from the identified KOP locations. These short term impacts would result from construction of Project facilities, as well as new access roads and associated vegetation clearing. Because the Applicant has committed to active dust suppression, as described in the ASC (Horse Heaven Wind Farm, LLC 2021a; Section 1.10, Mitigation Measures), potential visual impacts associated with visible dust plumes are not considered in this assessment. A summary of impacts during construction is provided in **Table 4.10-14a**, with a more detailed analysis following.

Turbine Option 1

Visual Aspects

Impacts on visual resources would be elevated during construction activities, including the movement of vehicles that would attract attention, due to increased activity at proposed temporary staging areas and throughout the Lease Boundary. The construction of access roads, crane paths, collector and communication lines, and wind turbines would be prominent when viewed within the foreground distance zone (0 to 0.5 miles) and would modify the existing landscape setting.

During construction, the removal of vegetation and earthwork would introduce areas of exposed soil, which would contrast with the existing setting until the area has been revegetated. The construction of access roads in the level to rolling terrain in the analysis area would require minimal modification of the existing terrain, resulting in negligible long term visual impacts. Impacts common to all KOPs during construction would include views of additional vehicular traffic and areas of exposed soil after the removal of vegetation and during earthwork activities. Viewers in the foreground distance zone (0 to 0.5 miles), or in locations where views would be occupied by a large portion of the Project under construction, would result in increased visual contrast in these views.

These impacts would be most intense during the 23-month construction schedule (as described in the ASC and in Chapter 2 of this Draft EIS) and would diminish after construction is complete and vegetation has been re-established. Following the initial seeding, completed after construction, the Applicant would continue to monitor these revegetation areas for three to five years and apply remedial actions to meet the success criteria outlined in Appendix N of the ASC (Horse Heaven Wind Farm, LLC 2021a). Construction activities for Turbine Option 1 would have medium, short term, probable, local impacts on visual resources.

Light

The Project would generate minimal light during construction under Turbine Option 1 from vehicles and equipment. Construction work would be concentrated during daylight hours, minimizing the potential need for temporary nighttime lighting. Given this, and the fact that lighting may not be used, light from construction would have negligible, temporary, unlikely, and limited impacts on off-site or sensitive receptors.

Glare

Similar to lighting, construction under Turbine Option 1 would generate minimal glare from vehicle and equipment windshields or glass enclosures. Therefore, glare from construction under this option would have low, temporary, feasible, and confined impacts on off-site or sensitive receptors.

Turbine Option 2

Visual Aspects

Impacts would be similar to Turbine Option 1. Because there are fewer proposed wind turbines requiring less ground disturbance for construction, there would be a reduced level of contrast and fewer modifications to the existing landscape character introduced during Project construction when compared to Turbine Option 1. However, the ratings of impacts are consistent between the two turbine options as construction of either option would occupy a large portion of the landscape contrasting with its existing character. Construction activities for Turbine Option 2 would have medium, short term, probable, local impacts on visual resources.

Light

The Project would generate minimal light related to vehicles and equipment during construction under Turbine Option 2. Construction work would be concentrated during daylight hours, minimizing the potential need for temporary nighttime lighting. Given this, and the fact that lighting may not be used, light from construction would have negligible, temporary, unlikely, and limited impacts on off-site or sensitive receptors.

Glare

Similar to lighting, construction under Turbine Option 2 would generate minimal glare from vehicle and equipment windshields or glass enclosures. Therefore, glare from construction under this option would have low, temporary, feasible, and confined impacts on off-site or sensitive receptors.

Solar Arrays

Visual Aspects

The construction of the solar arrays would result in impacts similar to those of the wind turbines but would occur within a smaller, more defined area associated with the selected solar array site. Within the fenced boundary, all lands would be disturbed through earthwork, vegetation clearing, and other construction efforts. Application of mitigation measures would reduce these impacts on the extent practicable to minimize these short term visual impacts, as described in Section 4.10.2.4. Construction activities for the solar arrays would have low, short term, probable, local impacts on visual resources.

Light

The Project would generate minimal light related to vehicles and equipment during construction of the solar arrays. Construction work would be concentrated during daylight hours, minimizing the potential need for temporary nighttime lighting. Therefore, light from construction of this Project component would have negligible, temporary, unlikely, and limited impacts on off-site or sensitive receptors.

Glare

Similar to light, the Project would generate minimal glare during construction of solar arrays from vehicle and equipment windshields or glass enclosures. Installation of the solar arrays would cause glare for a short time before construction ends and operation begins. Therefore, glare from construction of this Project component would have low, temporary, feasible, and confined impacts on off-site or sensitive receptors.

Battery Energy Storage Systems

Visual Aspects

Impacts related to construction of the BESSs would be similar to those of the proposed solar arrays and substations, with the proposed BESS sites located adjacent to the proposed substation locations. Construction of the BESSs would introduce additional motion from construction equipment into the setting. Additionally, the removal of vegetation and earthwork would introduce areas of exposed soil, which would contrast with the existing setting until vegetation has been restored. Construction activities for the BESSs would have low, short term, probable, local impacts on visual resources.

Light

Vehicles and equipment used for construction of the BESSs would generate minimal light. Construction work would be concentrated during daylight hours, minimizing the potential need for temporary nighttime lighting. Therefore, light from construction of this Project component would have negligible, temporary, unlikely, and limited impacts on off-site or sensitive receptors.

Glare

Similar to lighting, construction of BESSs would generate minimal glare from vehicle and equipment windshields or glass enclosures. Therefore, glare from construction of this Project component is expected to have low, temporary, feasible, and confined impacts on off-site or sensitive receptors.

Substations and Transmission Lines

Visual Aspects

Impacts from construction of the substations would be similar to the solar arrays, with the addition of multiple linear transmission lines connecting the proposed substations to the existing electrical grid. The construction of the transmission lines would include vegetation clearing within the right-of-way and construction of a series of tall, vertical structures. During construction, the motion associated with construction equipment, structure building, and conductor stringing, as well as vegetation clearing and landform modification would be noticeable and create visual contrast within the viewshed. Construction activities for the substations and transmission lines would have, low, short term, probable, local impacts on visual resources.

Light

The Project would generate minimal light during the construction of substations and transmission lines from vehicles and equipment. Construction work would be concentrated during daylight hours, minimizing the potential need for temporary nighttime lighting. Therefore, light from construction of this Project component would have negligible, temporary, unlikely, and limited impacts on off-site or sensitive receptors.

Glare

Similar to lighting, substation and transmission line construction would generate minimal glare from vehicle and equipment windshields or glass enclosures. Therefore, glare from construction of this Project component would have low, temporary, feasible, and confined impacts on off-site or sensitive receptors.

Comprehensive Project

Visual Aspects

During the 23-month construction schedule, there would be short term impacts from construction activities occupying a large portion of the landscape when considering all of the Project components combined (i.e., wind turbines, solar arrays, collector lines, access road, multiple transmission lines and substations, operations and maintenance [O&M] facility, and the BESSs). This would include views, glare, and lighting of additional vehicular traffic, as well as areas of exposed soil after the removal of vegetation and during earthwork activities. The removal of vegetation would be noticeable in the setting and contrast with the existing character; however, over time, after the temporary disturbance areas have been revegetated, vegetation patterns would begin to repeat those common in the area.

Viewpoints and KOPs located within the foreground distance zone (0 to 0.5 miles) would be most impacted by the construction of multiple Project components, particularly when a large portion of their viewshed is occupied by construction activities. These short term impacts are anticipated to extend beyond the neighboring receptors, resulting in potential regional impacts from more distant viewpoints where concurrent construction activities associated with multiple project components would occupy a large portion of their viewshed. Construction disturbance would be limited to the extent practicable in accordance with best management practices (BMPs) and the Project's site certificate conditions. After construction is completed, areas of temporary disturbance, including temporary access roads no longer used as Project access roads, would be restored to appear similar to their original condition. In general, vegetated areas that are temporarily disturbed or removed during construction of the Project would be revegetated to blend with adjacent undisturbed lands, and these areas would be monitored for three to five years postconstruction to meet a series of success criteria outlined in the Project's Revegetation and Noxious Weed Management Plan (Horse Heaven Wind Farm, LLC 2021a; Appendix N). Areas with soil compaction and disturbance from construction activities would also be revegetated in accordance with the Project's Revegetation and Noxious Weed Management Plan.

The Project would generate minimal light and glare during the construction process from vehicles and equipment, and minimal work would be performed during nighttime hours, limiting the need for temporary nighttime lighting (Horse Heaven Wind Farm, LLC 2021d). Additionally, glare from solar panel construction is not expected to be created until the panels are installed; therefore, the construction impacts related to glare would be equivalent to the operational glare generated by the Project.

In summary, activities during construction of all components of the Project would result in medium, short term, probable, regional impacts on visual resources.

Light

During the construction stage of the Project, work would be concentrated during daylight hours, minimizing the potential need for temporary nighttime lighting from vehicles, equipment, or temporary lighting. Additionally, construction at any given location would be temporary, as construction activities would move across the site from location to location and would not remain at any single location for the duration of the construction stage. Therefore, light from construction of this Project component would have negligible, temporary, unlikely, and limited impacts on off-site or sensitive receptors.

Glare

Similar to lighting, the Project would generate minimal glare during the construction stage from vehicle and equipment windshields or glass enclosures. Glare from solar panels during installation would cause glare for a short time before construction ends and operation begins. Therefore, glare from construction of the Project components combined is expected to have low, temporary, feasible, and confined impacts on off-site or sensitive receptors.

4.10.2.2 Impacts during Operation

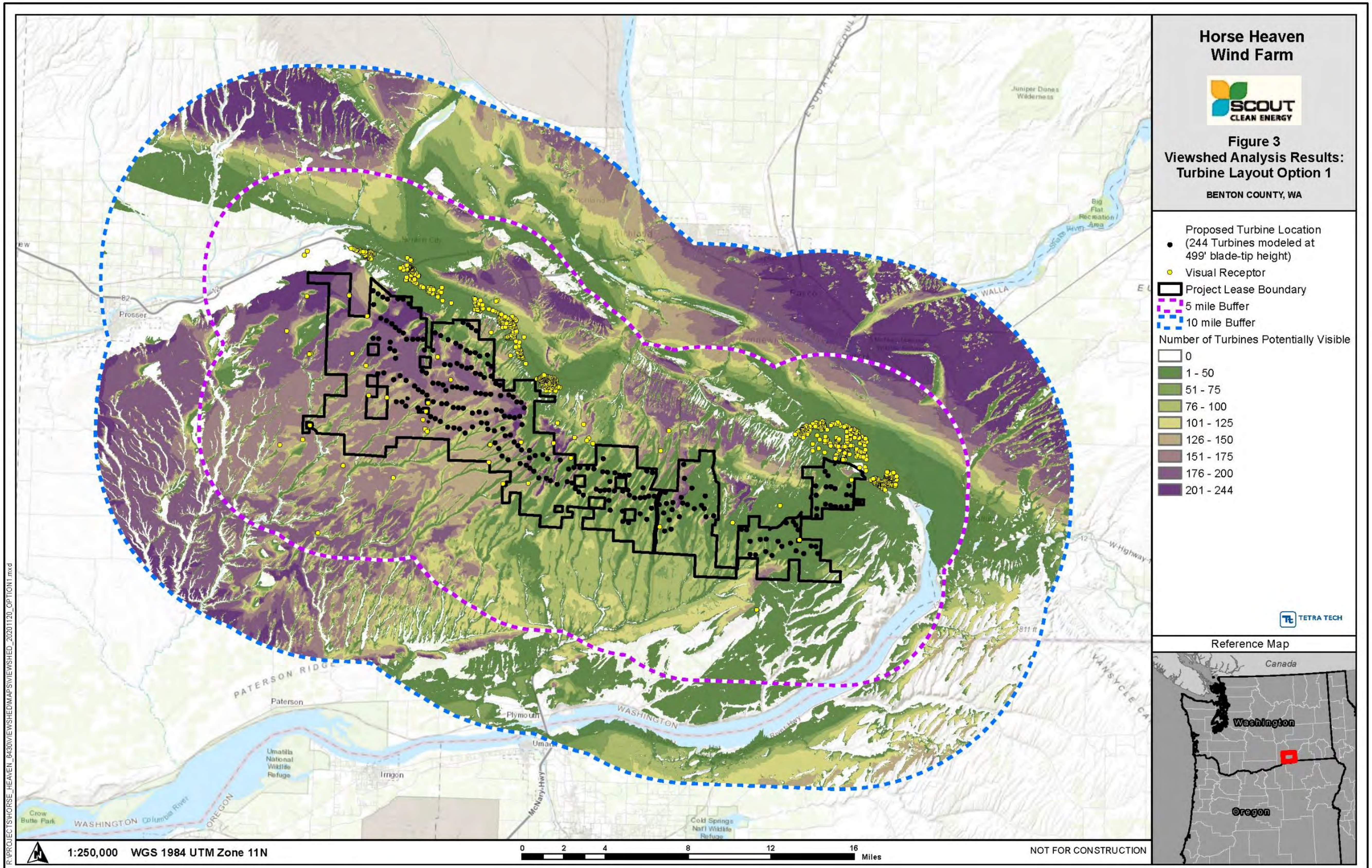
The introduction of the Project into the setting would result in long term modifications to the existing landscape's form, line, color, texture, and shadow flicker and would modify views from the identified KOP locations to varying degrees. Project operation would also introduce new sources of light and glare. Although visual impacts would depend on a variety of viewing conditions, the impacts would tend to change considerably with distance. These effects would be most impactful on residential, travel route, and recreational viewers located within the foreground distance zone (0 to 0.5 miles) where the Project would create strong vertical and horizontal forms and lines that would contrast with the primarily organic forms of the existing setting. There are 13 residences located on non-participating properties that would have foreground views (less than 0.5 miles) of either the proposed turbines or solar arrays.

Impacts on views from the middle ground (0.5 to 5 miles) would vary based on the extent of existing modifications in view. For locations with views of the existing Nine Canyon Wind Project, or where the existing transmission lines already dominate the view, the Project would typically result in medium impacts and would be viewed as co-dominant within the existing setting. From viewpoints where existing modifications do not currently attract attention, the Project would dominate views since a large portion of the viewshed would typically be occupied by large, spinning wind turbines. From this distance, the individual turbines tend to visually "merge" with other turbines in the string from some viewing angles, resulting in the turbines appearing larger in mass and scale.

From more distant views, within the background distance zone (more than 5 miles away), the proposed wind turbines would appear as vertical lines with a faint spinning motion of the blades—particularly when seen skylined above ridges or other highpoints within the landscape. The proposed solar arrays and other Project components would be mostly indiscernible from the background distance zone.

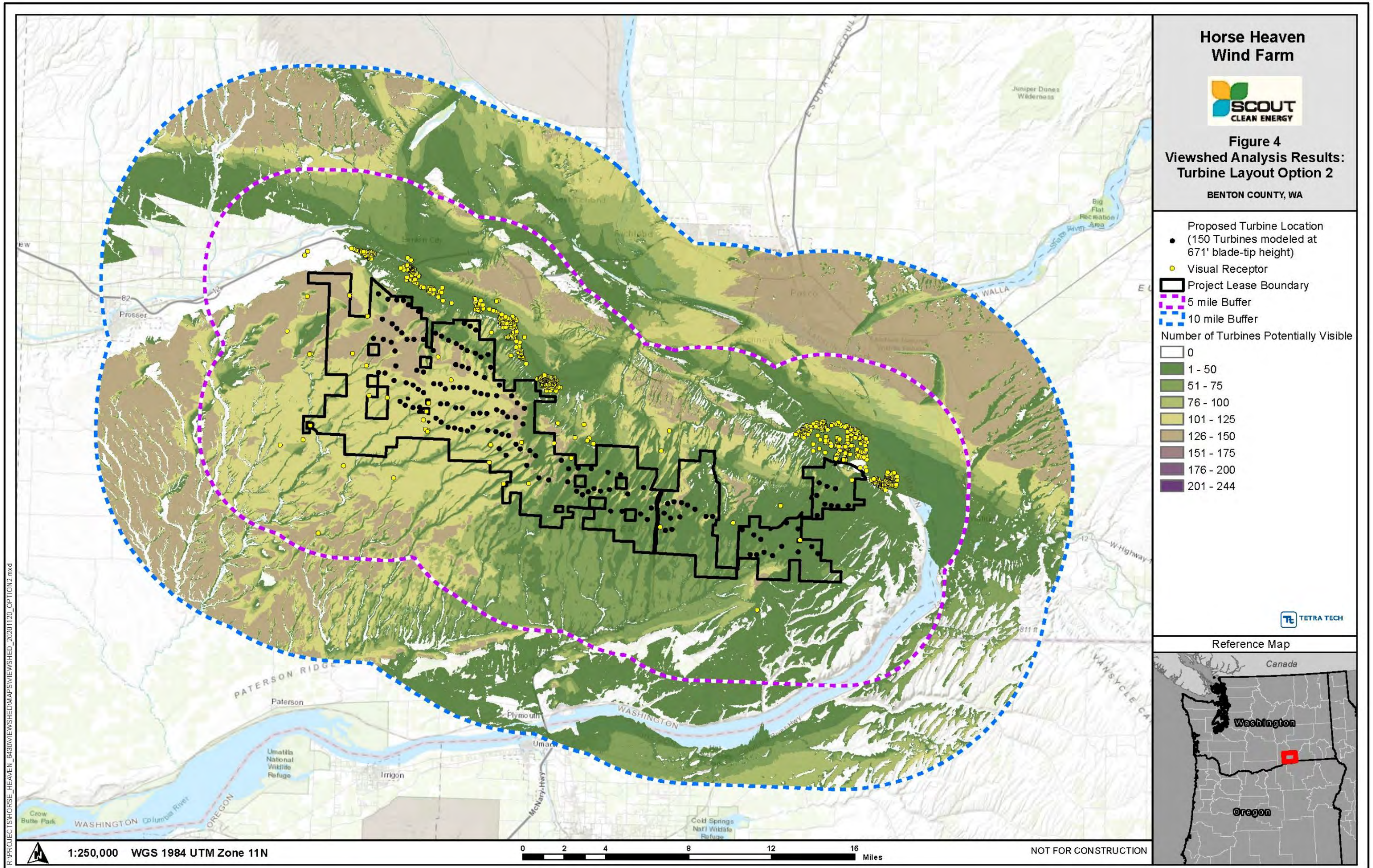
See **Figures 4.10-3 through 4.10-8** for the results of the viewshed analyses by proposed component. A summary of impacts during operation is provided in **Table 4.10-14b**, with a more detailed analysis following.

This Page Intentionally Left Blank



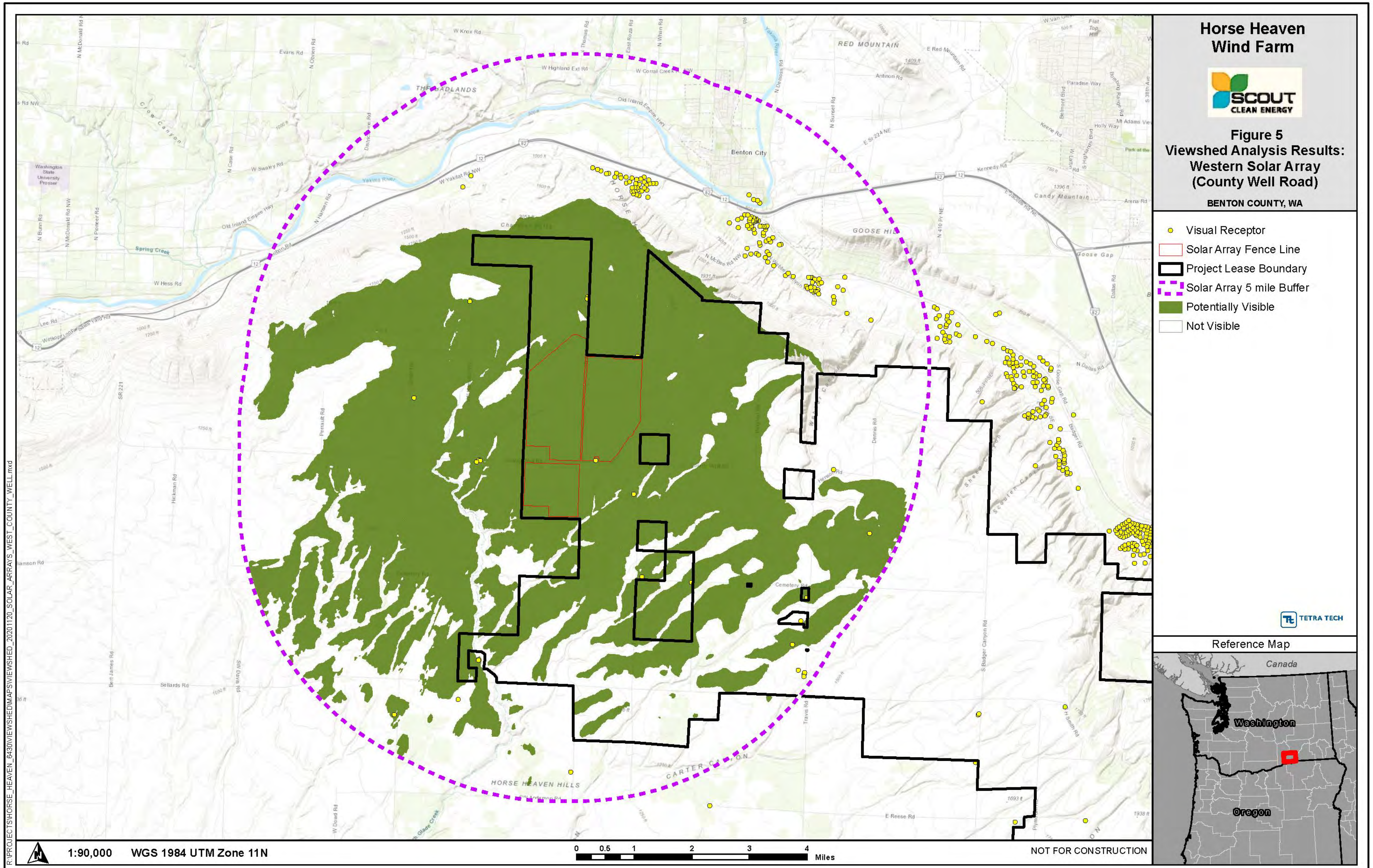
Source: Horse Heaven Wind Farm, LLC 2021b

Figure 4.10-3: Viewshed Analysis Results: Turbine Layout Option 1



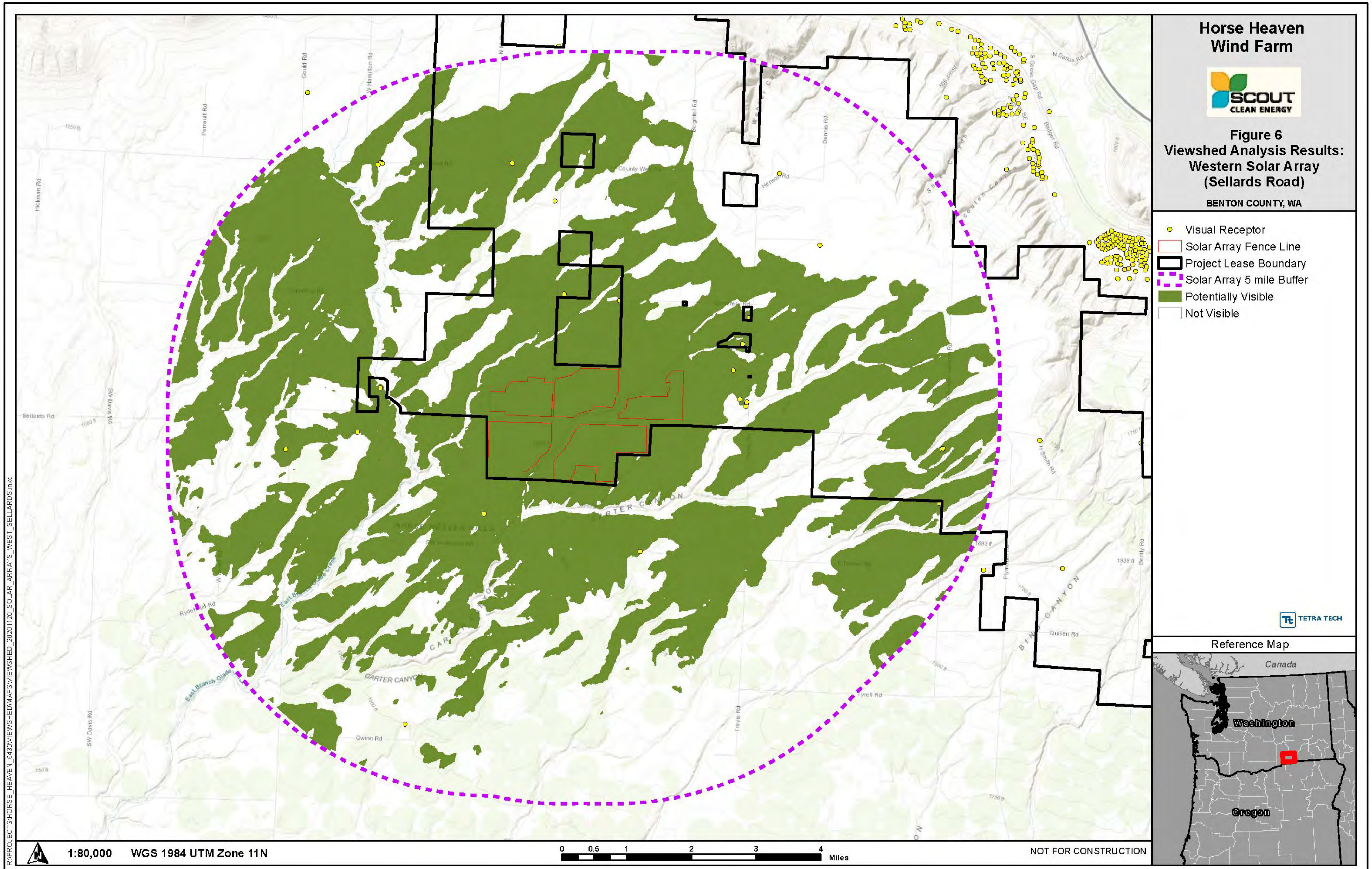
Source: Horse Heaven Wind Farm, LLC 2021b

Figure 4.10-4: Viewshed Analysis Results: Turbine Layout Option 2



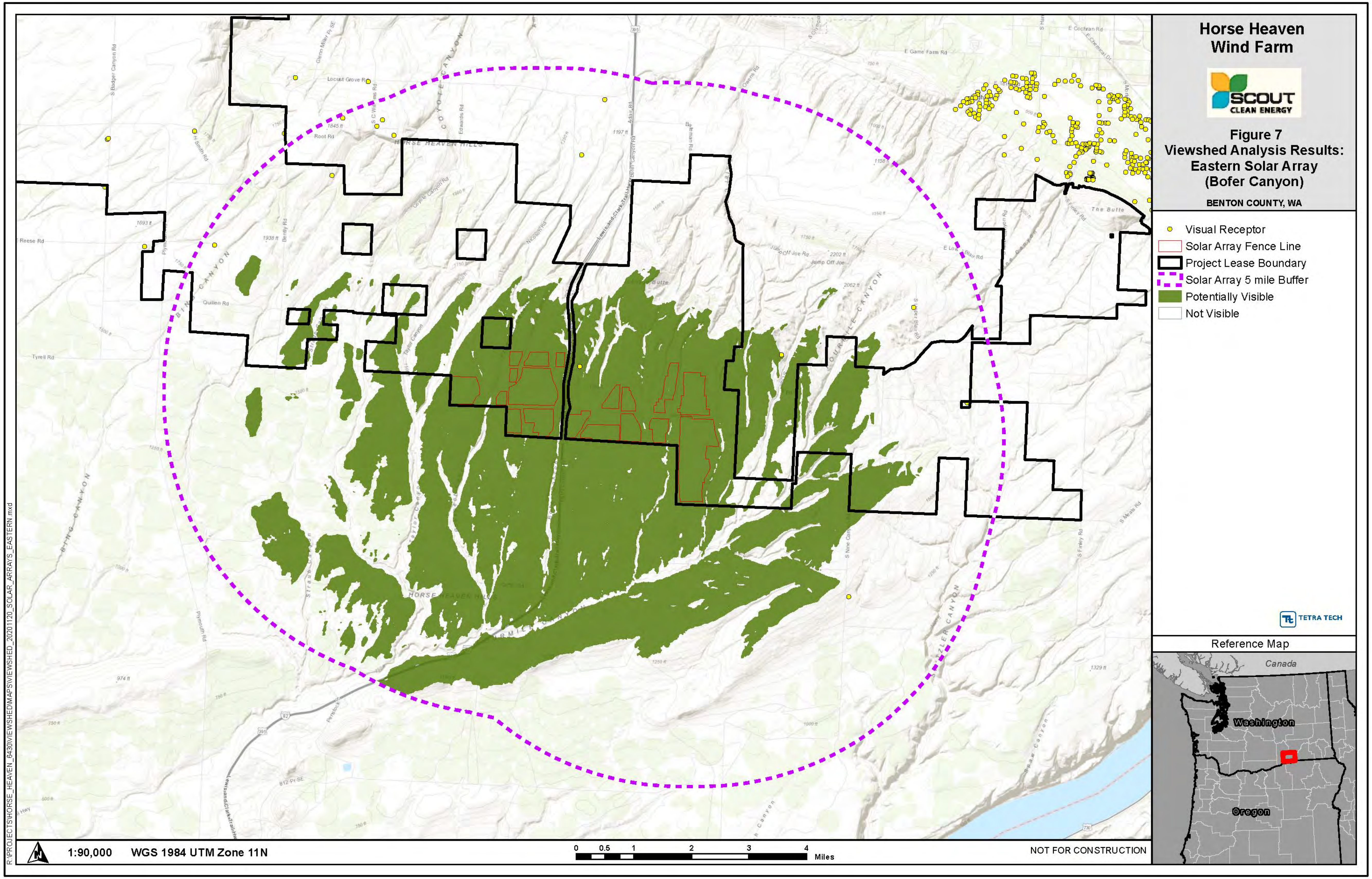
Source: Horse Heaven Wind Farm, LLC 2021b

Figure 4.10-5: Viewshed Analysis Results: Western Solar Array (County Well Road)



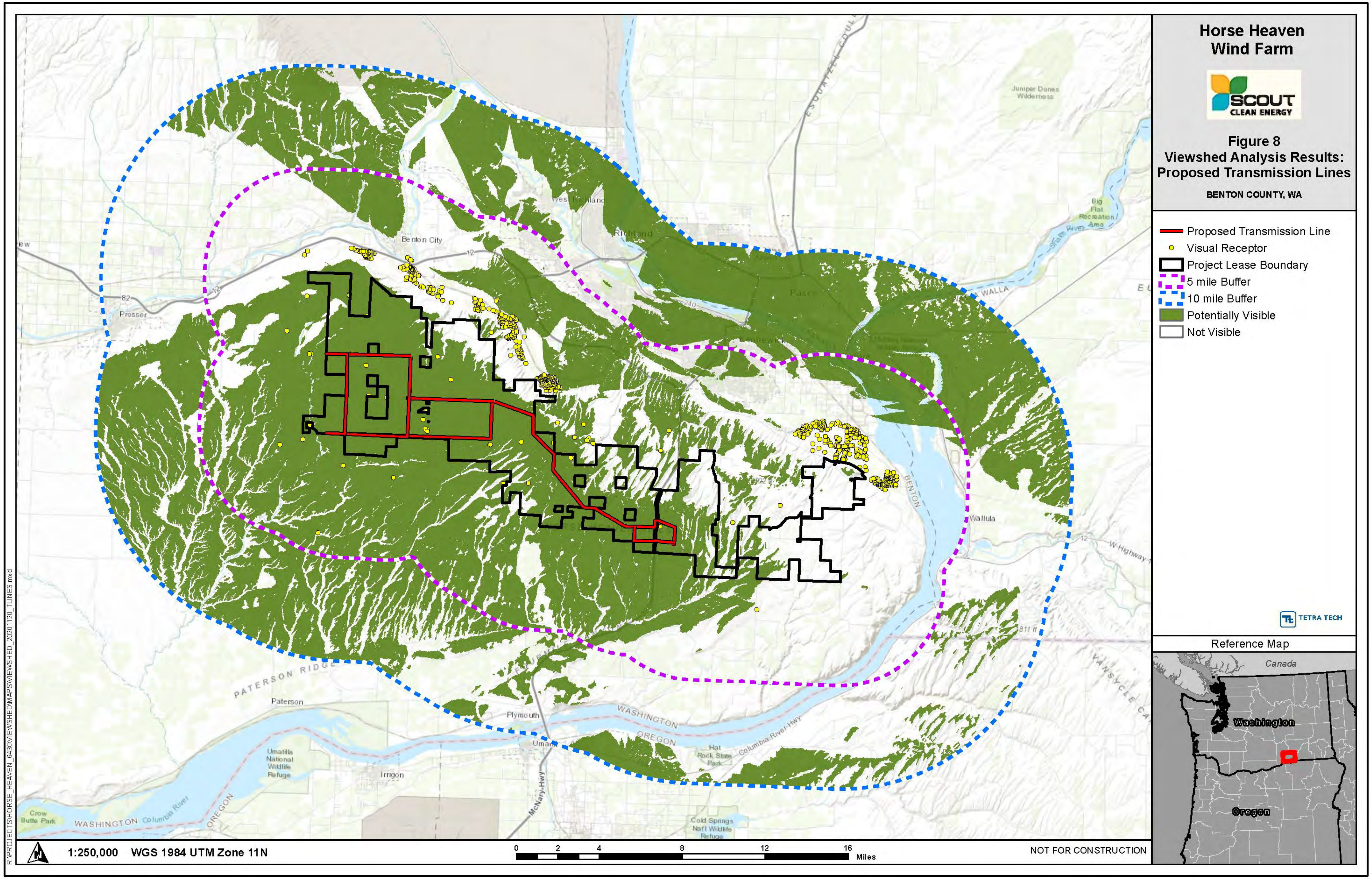
Source: Horse Heaven Wind Farm, LLC 2021b

Figure 4.10-6: Viewshed Analysis Results: Western Solar Array (Sellards Road)



Source: Horse Heaven Wind Farm, LLC 2021b

Figure 4.10-7: Viewshed Analysis Results: Eastern Solar Array (Bofer Canyon)



Source: Horse Heaven Wind Farm, LLC 2021b

Figure 4.10-8: Viewshed Analysis Results: Proposed Transmission Lines

Turbine Option 1

Visual Aspects

Under Turbine Option 1, impacts on landscape character would range from medium to high. The Project would generally dominate the existing landscape character through the introduction of a large number of vertical protrusions that would be out of scale with and highly prominent in the landscape. The turbines would be most prominent where sited near the Horse Heaven Hills ridgeline, resulting in high impacts on landscape character. These structures would also introduce spinning movement into the landscape, which would attract attention throughout the area of analysis—particularly where the existing Nine Canyon Wind Project is not visible. Impacts on landscape character would be medium near the existing Nine Canyon Wind Project, since this portion of the landscape—particularly the area east of I-82—has already been modified. In general, the existing level of landscape intactness would be diminished, resulting in landscapes characterized by energy generation, compared to the existing agrarian landscape character.

Impacts on key views would range from medium to high. **Table 4.10-9** provides an overview of the impacts from each KOP/viewpoint and includes the viewer position, extent of the horizontal view occupied by the Project, level of contrast, and magnitude of impact.

In summary, activities during operation under Turbine Option 1 would result in areas of high, long-term, unavoidable, regional impacts on visual resources.

Table 4.10-9 Key Observation Point/Viewpoint Impact Table – Turbine Option 1

KOP #	Viewer Name	Viewer Type	Distance to Project	Viewer Position	Approx. Extent of Horizontal View Occupied by Project	Level of Visual Contrast	Magnitude of Impact	Impact Description
1	McNary NWR	Recreation	5.2 miles	Inferior	80 degrees	Moderate	Medium	The turbines would be similar in appearance to the existing Nine Canyon Wind Project, also visible from this location, but the proposed turbines would be larger and out of scale with the existing landscape. Views would be unobstructed toward the Lease Boundary. The prominence of the proposed wind turbines rising above the landscape, including additional motion introduced by the spinning turbine blades, would further attract attention from viewers and dominate the existing landscape character. Because visitors and travelers would be visiting for a limited time, the level of contrast would be reduced by the short view duration, limiting the influence of the Project on these views. The Project would expand the extent of view occupied by moving wind turbines and would be prominent from this inferior viewing angle, resulting in medium, long term impacts on views.
2	S Clodfelter Road – East, Central, and West	Residential	3.0 miles	Inferior	200 degrees	Strong	High	The proposed turbines would dominate views from this location, approximately 3 miles away, as a large portion of the viewshed would include moving wind turbines. Views of the Project in open, rolling hills would be unobstructed. Views toward the east would include the existing Nine Canyon Wind Project, which occupies only a narrow portion of the landscape as viewed from this location. The series of proposed skylined wind turbines would be highly prominent in the view, resulting in high, long term impacts on views, particularly where views of multiple wind turbines would overlap and appear larger in mass.

Table 4.10-9 Key Observation Point/Viewpoint Impact Table – Turbine Option 1

KOP #	Viewer Name	Viewer Type	Distance to Project	Viewer Position	Approx. Extent of Horizontal View Occupied by Project	Level of Visual Contrast	Magnitude of Impact	Impact Description
3	Chandler Butte	Recreation	2.5 miles	Superior	50 degrees	Strong	High	The proposed turbines would dominate views from this location, approximately 2.5 miles away, as a moderate portion of the viewshed would include moving wind turbines. Views of the Project in an open plains landscape would be unobstructed, with views of the existing Nine Canyon Wind Project occurring approximately 20 miles away on the distant hills. Due to the superior viewing angle, the contrast between the light color of the turbines and the darker color of the ground would create strong visual contrast, visible to recreationists along Chandler Butte. The series of proposed wind turbines would be highly prominent in the view, resulting in high, long term impacts on views, particularly where views of multiple wind turbines would overlap and appear larger in mass.
4	I-82 South	Travel route	7.0 miles	Inferior	100 degrees	Moderate	Medium	The proposed turbines would attract attention from this location, approximately 7 miles away, as a large portion of the viewshed would include moving wind turbines. Due to the distance, the turbine's form would be distinguishable, but the texture and color would be muted and less detailed. Views from I-82 include an existing transmission line and the Nine Canyon Wind Project, approximately 12 miles away, with these existing features influencing but not dominating views from this location. As travelers drive on I-82 from this point to KOP 6, approximately 10 miles, impacts on views of the proposed wind turbines would incrementally increase. From this location, the turbines would be viewed unobstructed and skylined, which would attract attention, particularly where only moving turbine blades would be seen over the horizon. The impacts on these views would be medium and long term.

Table 4.10-9 Key Observation Point/Viewpoint Impact Table – Turbine Option 1

KOP #	Viewer Name	Viewer Type	Distance to Project	Viewer Position	Approx. Extent of Horizontal View Occupied by Project	Level of Visual Contrast	Magnitude of Impact	Impact Description
5	Badger Mountain	Recreation	4.7 miles	Level	150 degrees	Strong	High	The proposed turbines would dominate views from this location, approximately 5 miles away, as a large portion of the viewshed would include moving wind turbines. Views of the Project in open, rolling hills would be unobstructed, occurring beyond developed lands of Badger and the Horse Heaven Hills ridgeline. The series of proposed skylined wind turbines would be highly prominent in the view, resulting in high, long term impacts on views, particularly where views of multiple wind turbines would overlap and appear larger in mass.
6	Bofer Canyon Road/I-82	Travel route	1.7 miles	Level	120 degrees	Strong	High	The proposed turbines would be viewed within the context of an existing transmission line from this KOP. The existing transmission line has introduced strong vertical lines into the existing setting. Due to the proximity of the proposed turbines (less than 2 miles), the introduction of movement into the landscape, and the extent of view occupied by these structures, the Project would dominate views from this location along Bofer Canyon Road and I-82. These impacts would continue to increase as viewers would pass the existing transmission line into an area where views of the proposed turbines would be highly prominent as viewed both to the east and west. Based on the landscape modifications introduced by the proposed wind turbines, the Project would result in high, long term impacts on views.

Table 4.10-9 Key Observation Point/Viewpoint Impact Table – Turbine Option 1

KOP #	Viewer Name	Viewer Type	Distance to Project	Viewer Position	Approx. Extent of Horizontal View Occupied by Project	Level of Visual Contrast	Magnitude of Impact	Impact Description
7	Highway 221	Travel route, residential	5.8 miles	Level	70 degrees	Moderate	Medium	The proposed turbines would be viewed within the context of a distant existing transmission line, which has introduced a series of skylined structures along the horizon. The proposed turbines would, however, appear larger and out of scale with the features of the existing landscape. Views would be unobstructed toward the Lease Boundary. The prominence of the proposed wind turbines rising above the landscape, including the introduction of motion, would further attract attention from viewers and modify the existing landscape character. The Project would be prominent within a moderate portion of the viewshed, resulting in medium, long term impacts on views.
8	Kennewick (Canyon Lakes Area) – South and West	Residential	3.6 miles	Inferior	170 degrees	Strong	High	The proposed turbines would dominate views from this location, approximately 3.5 miles away, as a large portion of the viewshed would include moving wind turbines. Views of the Project in open, rolling hills would be unobstructed toward the west and would include an existing transmission line. Views to the southeast include the existing Nine Canyon Wind Project, which occupies a narrow portion of the landscape as viewed from this location. The series of proposed skylined wind turbines would be highly prominent in the view, resulting in high, long term impacts on views, particularly where views of multiple wind turbines would overlap and appear larger in mass.

Table 4.10-9 Key Observation Point/Viewpoint Impact Table – Turbine Option 1

KOP #	Viewer Name	Viewer Type	Distance to Project	Viewer Position	Approx. Extent of Horizontal View Occupied by Project	Level of Visual Contrast	Magnitude of Impact	Impact Description
9	Benton City	Residential, travel route, commercial	2.7 miles	Inferior	10 to 80 degrees (based on level of screening)	Moderate	Medium	The proposed wind turbines would be intermittently screened by development within Benton City, with partial screening of the Project features occurring where the Horse Heaven Hills would partially obstruct views to the south. Where visible, there would be a limited number of turbines in view, as depicted in the visual simulation.[a] The presence and motion of the turbines would attract attention but would appear co-dominant with other commercial and residential developments. Other areas within the city may have more expansive, unobstructed views of the proposed wind turbines, similar to KOPs 2 and 10. The Project would expand the extent of view occupied by moving wind turbines and would be prominent from this inferior viewing angle, resulting in medium, long term impacts on views.
10	Badger Road	Residential, travel route	1.5 miles	Inferior	150 degrees	Strong	High	The proposed turbines would dominate views from this location, approximately 1.5 miles away, as a large portion of the viewshed would include moving wind turbines. Views of the proposed wind turbines, from an inferior viewing angle, would be partially screened by topography and intermittently screened by development. Movement associated with the turbine blades would be highly visible, particularly where only the blades would visible, repeatedly rising over the hills. Based on the level of contrast introduced by the proposed wind turbines, which are much larger in scale than existing modifications in view, the Project would result in high, long term impacts on views.

Table 4.10-9 Key Observation Point/Viewpoint Impact Table – Turbine Option 1

KOP #	Viewer Name	Viewer Type	Distance to Project	Viewer Position	Approx. Extent of Horizontal View Occupied by Project	Level of Visual Contrast	Magnitude of Impact	Impact Description
11	Highland/ Finley Area	Residential	2.0 miles	Inferior	100 degrees	Strong	High	The proposed turbines would dominate views from this location, approximately 2 miles away, as a large portion of the viewshed would include moving wind turbines. Views of the Project on the Horse Heaven Hills would be unobstructed, with views toward the southwest including residential and agricultural development, as well as the existing Nine Canyon Wind Project, which occupies a moderate portion of the landscape as viewed from this location. The series of proposed skylined wind turbines would be highly prominent in the view, resulting in high, long term impacts on views, particularly where views of multiple wind turbines would overlap and appear larger in mass.
12	County Well Road	Residential, travel route	2.5 miles	Level	100 degrees	Moderate	Medium	The proposed turbines would be viewed in the context of an existing transmission line, which has already modified the existing setting, including the introduction of distinct, vertical lines. Due to the proximity of the proposed turbines (approximately 2.5 miles), the introduction of movement into the landscape, and the extent of view occupied by these structures, the Project would attract attention and begin to dominate views from this location. In consideration of the existing modifications in view, the Project would result in medium, long term impacts on views from this location. These impacts would continue to increase as viewers would pass the existing transmission line into an area where views of the proposed wind turbines would be prominent.

Table 4.10-9 Key Observation Point/Viewpoint Impact Table – Turbine Option 1

KOP #	Viewer Name	Viewer Type	Distance to Project	Viewer Position	Approx. Extent of Horizontal View Occupied by Project	Level of Visual Contrast	Magnitude of Impact	Impact Description
13	Travis Road South of Sellards Road	Residential, travel route	1.1 miles	Level	150 degrees	Strong	High	The proposed turbines would dominate views from this location, approximately 1 mile away, as a large portion of the viewshed would include moving wind turbines. Views of the Project in open, rolling hills would be unobstructed within a mostly intact existing landscape. The series of proposed skylined wind turbines would be highly prominent in the view, resulting in high, long term impacts on views, particularly where views of multiple wind turbines would overlap and appear larger in mass.
N/A	Dispersed residences located 0.5 miles from proposed turbines (foreground views)	Residential	Less than 0.5 miles	Level	Up to 300 degrees	Strong	High	The proposed turbines would dominate views from dispersed residences located within the foreground distance zone (includes views from participating and non-participating properties). These views would be most impacted where views of the existing Nine Canyon Wind Project, and existing transmission lines would be screened, with the proposed turbines dominating a viewshed with limited existing modifications. The prominence of the proposed wind turbines rising above the landscape, including additional motion introduced by the turbine blades, would further attract attention from viewers and dominate the existing landscape character, resulting in high, long term impacts on views from these locations. Viewers located on participating properties may have less visual sensitivity to modifications introduced by the Project, compared to viewers located on non-participating properties, but the level of visual contrast and Project dominance would remain the same.

Table 4.10-9 Key Observation Point/Viewpoint Impact Table – Turbine Option 1

KOP #	Viewer Name	Viewer Type	Distance to Project	Viewer Position	Approx. Extent of Horizontal View Occupied by Project	Level of Visual Contrast	Magnitude of Impact	Impact Description
N/A	Horse Heaven Hills Recreation Area	Recreation	0.8 miles	Superior, level, and inferior	Up to 140 degrees	Strong	High	Views from the Horse Heaven Hills Recreation Area vary based on location, with elevated views represented by KOP 3, located on Chandler Butte, to inferior views occurring below the ridgeline and similar to KOPs 9 and 10. In general, views from this recreation area would be highly impacted where the Project would modify a large portion of the viewshed through the introduction of moving wind turbines. While hiking on trails below the ridge but within the recreation area, views may be partially screened by topography where visitors would only see the moving turbine blades repeatedly rising over the ridgeline, as described for KOP 10. Viewers along the ridgeline trail would be located directly adjacent to the proposed turbines, where views would be strongly altered by the Project. The series of proposed wind turbines would be highly prominent in the view, resulting in high, long term impacts on views from Chandler Butte, below the ridgeline trails, and from the ridgeline trail.

Note:
[a] Horse Heaven Wind Farm, LLC 2021b
For more information associated with each KOP location, refer to Table 3.10-2.
I-82 = Interstate 82; KOP = key observation point; N/A = not appliable; NWR = National Wildlife Refuge

Shadow Flicker

The WindPRO program predicted that shadow flicker impacts would be greatest at locations nearest to the turbines. The shadow flicker impact area for Turbine Option 1 is shown in **Figure 4.10-9**. **Table 4.10-10** presents the WindPro-predicted shadow flicker impacts for the receptors with the greatest (maximum) predicted impacts. The predicted shadow flicker impacts for all 742 receptors for both turbine option layouts are presented in the ASC (Horse Heaven Wind Farm, LLC 2021c).

Table 4.10-10: WindPRO Maximum Expected Shadow Flicker Impacts for Turbine Option 1

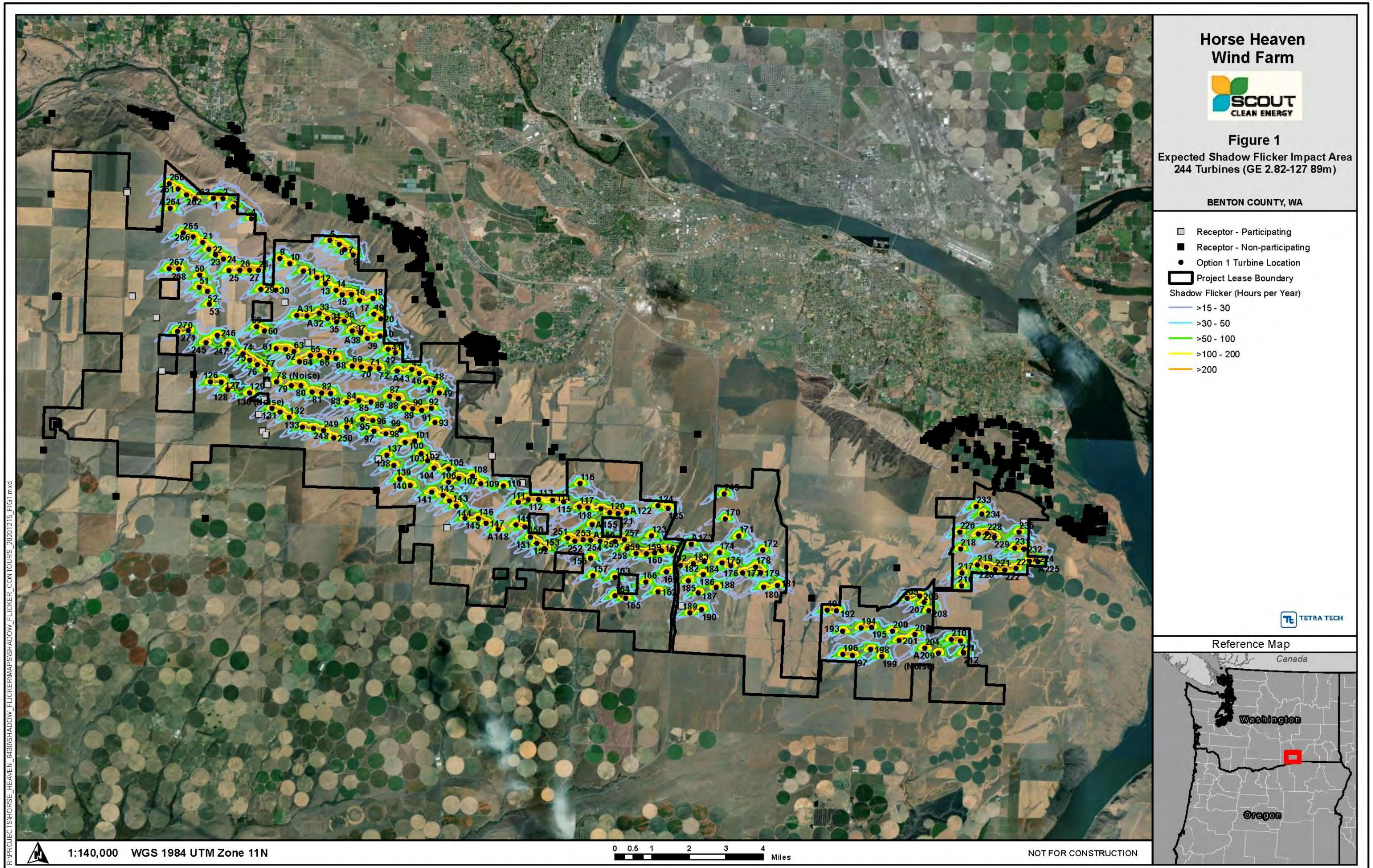
Receptor ID	Participation Status[(a)]	UTM Coordinates (meters)		Expected Shadow Flicker in Hours Per Year (h:mm)
		Easting	Northing	
177	Participant	310436.37	5114156.19	55:07
176	Participant	310274.46	5113505.54	38:12
223	Participant	315253.07	5110907.42	30:34
141	Participant	310040.91	5112851.79	27:43
222	Participant	315230.93	5110885.00	24:23

Source: Horse Heaven Wind Farm, LLC 2021c
Note:
(a) Participant = participating landowners, with whom the Applicant has lease agreements
h:mm = hours and minutes per year; ID = identification number; UTM = Universal Transverse Mercator

The maximum predicted shadow flicker impact at a single receptor is 55 hours and 7 minutes per year (Receptor ID 177) for the Project's Turbine Option 1. This highest predicted shadow flicker impact is approximately 1.3 percent of the potential available daylight hours in any given year at the Project location. Three receptors were predicted to experience more than the industry standard threshold of 30 hours of shadow flicker per year (Receptor IDs 176, 177, and 223). All three receptors have been identified as Project participants.

From a health impact perspective, Epilepsy Action (the working name for the British Epilepsy Foundation) states that while some people are sensitive to flicker rates of 3 hertz (Hz; or flashes per second) or higher, large turbines rotate at a rate that is unlikely to trigger seizures (Epilepsy Action 2018). The Project's maximum turbine blade pass frequency is approximately 0.79 Hz (i.e., less than one alternation per second; Horse Heaven Wind Farm, LLC 2021c); therefore, no negative health impacts on individuals with photosensitive epilepsy are anticipated.

The analysis conducted by the Applicant was deliberately conservative, and actual shadow flicker is expected to occur for less than the modeled durations. The analysis assumes that the receptors all have a direct in-line view of the incoming shadow flicker sunlight, and it does not account for trees or other obstructions that may block sunlight. In reality, the windows of many houses will not face the sun directly for the key shadow flicker impact times (Horse Heaven Wind Farm, LLC. 2021c). Based on these results, shadow flicker during operation under Turbine Option 1 would result in medium, long term, probable, confined impacts on receptors that have been identified as Project participants.



Source: Horse Heaven Wind Farm, LLC 2021c

Figure 4.10-9: Expected Shadow Flicker Impact Area Turbine Option 1 (GE 2.82-127 89m)

Light

Aviation lighting of a single red flashing light would be mounted on turbine nacelles per FAA requirements for turbines with a maximum blade tip height of 499 feet (FAA 2020). The Applicant is anticipating that it will light approximately 86 percent (or up to 210 of the 244 turbines) based on the most recent turbine layout (Kobus 2022). This is subject to change. Additionally, up to four permanent meteorological towers would also be lighted as specified by the FAA. These lights would be most visible at night, akin to lighted communication towers common to the area. While visible in the distance, these lights will not measurably increase light received at neighboring receptors. Over such a large area, the addition of 210 lights is not expected to cause light trespass, nor add to sky glow.

Lighting from operations under Turbine Option 1 will not result in a safety hazard, and impacts will be low, long term, unavoidable, and local.

Turbine Option 2

Visual Aspects

The Project, under Turbine Option 2, would have high impacts on landscape character, similar to those under Turbine Option 1. There would be fewer structures introduced into the setting under this option, which would result in less visual clutter; however, due to the increased height of the structures under Turbine Option 2, these effects would be balanced, resulting in overall similar effects. The additional height of Turbine Option 2 turbines would be more prominent near the Horse Heaven Hills ridgeline or adjacent to existing landscape modifications, where the increased vertical forms would be most evident.

Table 4.10-11 describes the impacts on views from the KOPs and other viewing locations associated with Turbine Option 2. In summary, activities during operation of Turbine Option 2 would result in areas of high, long term, unavoidable, regional impacts on visual resources.

Table 4.10-11. Key Observation Point/Viewpoint Impact Table – Turbine Option 2

KOP #	Viewer Name	Viewer Type	Distance to Project	Viewer Position	Approx. Extent of Horizontal View Occupied by Project	Level of Visual Contrast	Magnitude of Impact	Impact Description
1	McNary NWR	Recreation	5.8 miles	Inferior	80 degrees	Moderate	Medium	Impacts would be similar to Option 1, except the taller turbines would be more prominent as viewed on the ridgeline. There would be fewer turbines in view, resulting in a less cluttered appearance, but since the proposed turbines would be larger in scale (and even larger as compared to the existing Nine Canyon Wind Project), the Project would result in medium, long term impacts on views.
2	S Clodfelter Road – East, Central, and West	Residential	3.5 miles	Inferior	200 degrees	Strong	High	Impacts would be similar to Option 1 except the taller turbines would be more prominent as viewed on the ridgeline. There would be fewer turbines in view, resulting in a less cluttered appearance, particularly where views of multiple wind turbines would overlap and appear larger in mass. Since the proposed turbines would be larger in scale (and even larger as compared to the existing Nine Canyon Wind Project), the effects of a less cluttered view would be counterbalanced, resulting in high, long term impacts on views.
3	Chandler Butte	Recreation	2.8 miles	Superior	50 degrees	Strong	High	Impacts would be similar to Option 1, except the taller turbines would be more prominent across the landscape. There would be fewer turbines in view, resulting in a less cluttered appearance, particularly where views of multiple wind turbines would overlap and appear larger in mass. Since the proposed turbines would be larger in scale (and even larger as compared to the existing Nine Canyon Wind Project), the effects of a less cluttered view would be counterbalanced, resulting in high, long term impacts on views.

Table 4.10-11. Key Observation Point/Viewpoint Impact Table – Turbine Option 2

KOP #	Viewer Name	Viewer Type	Distance to Project	Viewer Position	Approx. Extent of Horizontal View Occupied by Project	Level of Visual Contrast	Magnitude of Impact	Impact Description
4	I-82 South	Travel route	7.3 miles	Inferior	100 degrees	Moderate	Medium	Impacts would be similar to Option 1 except the taller turbines would result in fewer turbines within view. The presence of fewer turbines would produce a less cluttered appearance, particularly where views of multiple wind turbines would overlap and appear larger in mass. Since the proposed turbines would be larger in scale (and even larger as compared to the existing Nine Canyon Wind Project), the effects of a less cluttered appearance would be counterbalanced, resulting in medium, long term impacts on views.
5	Badger Mountain	Recreation	4.7 miles	Level	150 degrees	Strong	High	Impacts would be similar to Option 1, except the taller turbines would be more prominent as viewed on the ridgeline. There would be fewer turbines in view, resulting in a less cluttered appearance, particularly where views of multiple wind turbines would overlap and appear larger in mass. The relative scale of the turbines proposed for Option 2, compared to Option 1, would be apparent as views include residential and agricultural development, providing a source of scale comparison.
6	Bofer Canyon Road/I-82	Travel route	1.8 miles	Level	120 degrees	Strong	High	Impacts would be similar to Option 1 but slightly increased in magnitude. The taller turbines proposed under this option would be apparent due to the existing transmission line providing a source of scale comparison, and most of the turbines proposed adjacent to this viewpoint would occur regardless of the option selected.

Table 4.10-11. Key Observation Point/Viewpoint Impact Table – Turbine Option 2

KOP #	Viewer Name	Viewer Type	Distance to Project	Viewer Position	Approx. Extent of Horizontal View Occupied by Project	Level of Visual Contrast	Magnitude of Impact	Impact Description
7	Highway 221	Travel route, residential	5.8 miles	Level	70 degrees	Moderate	Medium	Impacts would be similar to Option 1 except the taller turbines would be more prominent as viewed from the highway. There would be fewer turbines in view, resulting in a less cluttered appearance, but since the proposed turbines would be larger in scale (and even larger as compared to the existing transmission line in view), the Project would result in medium, long term impacts on views.
8	Kennewick (Canyon Lakes Area) – South and West	Residential	5.4 miles	Inferior	170 degrees	Moderate	Medium	Impacts on views would be reduced under Option 2, as the closest proposed wind turbine would be1.8 miles further away compared to Option 1 (approximately 3.6 miles). There would also be fewer turbines in view, resulting in a less cluttered appearance. However, since the proposed turbines would be larger in scale (and even larger as compared to the existing Nine Canyon Wind Project), the Project would result in medium, long term impacts on views.
9	Benton City	Residential, travel route, commercial	2.7 miles	Inferior	10 to 80 degrees (based on level of screening)	Moderate	Medium	Impacts would be similar to Option 1 but slightly increased in magnitude. The taller turbines proposed under this option would be more prominent, and most of the turbines proposed adjacent to this viewpoint would occur regardless of the option selected.
10	Badger Road	Residential, travel route	1.5 miles	Inferior	150 degrees	Strong	High	Impacts would be similar to Option 1 except the taller turbines would be more prominent as viewed from this area. There would be fewer turbines in view, resulting in a less cluttered appearance, but since the proposed turbines would be larger in scale, (and even larger as compared to the existing modifications in view), the Project would result in high, long term impacts on views.

Table 4.10-11. Key Observation Point/Viewpoint Impact Table – Turbine Option 2

KOP #	Viewer Name	Viewer Type	Distance to Project	Viewer Position	Approx. Extent of Horizontal View Occupied by Project	Level of Visual Contrast	Magnitude of Impact	Impact Description
11	Highland/ Finley Area	Residential	2.5 miles	Inferior	100 degrees	Strong	High	Impacts would be similar to Option 1, except the taller turbines would be more prominent as viewed on the ridgeline. There would be fewer turbines in view, resulting in a less cluttered appearance, particularly where views of multiple wind turbines would overlap and appear larger in mass. Since the proposed turbines would be larger in scale (and even larger as compared to the existing Nine Canyon Wind Project), the effects of a less cluttered appearance would be counterbalanced, resulting in high, long term impacts on views.
12	County Well Road	Residential, travel route	2.5 miles	Level	100 degrees	Moderate	Medium	Impacts would be similar to Option 1 but slightly increased in magnitude. The taller turbines proposed under this option would be apparent due to the existing transmission line that provides a source of scale comparison.
13	Travis Road South of Sellards Road	Residential, travel route	1.1 miles	Level	150 degrees	Strong	High	Impacts would be similar to Option 1 but slightly increased in magnitude. The taller turbines proposed under this option would be apparent due to the existing development in view, which provides a source of scale comparison.
N/A	Dispersed residences located 0.5 miles from proposed turbines (foreground views)	Residential	Less than 0.5 miles	Level	Up to 300 degrees	Strong	High	Impacts would be similar to Option 1 except the taller turbines would be more prominent as viewed from these residences. There would be fewer turbines in view, resulting in a less cluttered appearance. Since the proposed turbines would be larger in scale, the Project impacts would be most apparent where the existing Nine Canyon Wind Project or transmission lines are visible and provide a source of scale comparison. The Project would result in high, long term impacts on views.

Table 4.10-11. Key Observation Point/Viewpoint Impact Table – Turbine Option 2

KOP #	Viewer Name	Viewer Type	Distance to Project	Viewer Position	Approx. Extent of Horizontal View Occupied by Project	Level of Visual Contrast	Magnitude of Impact	Impact Description
N/A	Horse Heaven Hills Recreation Area	Recreation	0.8 miles	Inferior	Up to 140 degrees	Strong	High	Impacts would be similar to Option 1 except the taller turbines would be more prominent as viewed from this recreation area. There would be fewer turbines in view, resulting in a less cluttered appearance. However, since the proposed turbines would be larger in scale (and even larger as compared to the existing modifications in view), the Project would result in high, long term impacts on views.

KOP = key observation point; I-82 = Interstate 82; N/A = not applicable; NWR = National Wildlife Refuge

Shadow Flicker

The WindPRO program predicted that shadow flicker impacts would be greatest at locations nearest to the turbines. The shadow flicker impact areas for Turbine Option 2 are presented in **Figure 4.10-10**. **Table 4.10-12** presents the WindPro-predicted shadow flicker impacts for the receptors with the greatest predicted impacts. The predicted shadow flicker impact for all 742 receptors for both turbine option layouts are presented in the ASC (Horse Heaven Wind Farm, LLC 2021c).

Table 4.10-12: WindPRO Maximum Expected Shadow Flicker Impacts for Turbine Option 2

Receptor ID	Participation Status[(a)]	UTM Coordinates (meters)		Expected Shadow Flicker in Hours Per Year (h:mm)
		Easting	Northing	
214	Participant	317662.95	5111107.33	60:38
192	Participant	328441.37	5104524.33	33:42
188	Participant	312194.94	5115957.61	24:38
216	Participant	321512.68	5109870.31	15:58
140	Participant	310203.47	5112130.47	14:55

Source: Horse Heaven Wind Farm, LLC 2021c
(a) Participant = participating landowners, with whom the Applicant has lease agreements
h:mm = hours and minutes per year; ID = identification number; UTM = Universal Transverse Mercator

The maximum predicted shadow flicker impact at a single receptor is 60 hours and 38 minutes per year (Receptor ID 214). This highest predicted shadow flicker impact is approximately 1.4 percent of the potential available daylight hours in any given year at the Project location. Two receptors were predicted to experience more than the industry standard threshold of 30 hours of shadow flicker per year (Receptor IDs 192 and 214). Both have been identified as Project participants.

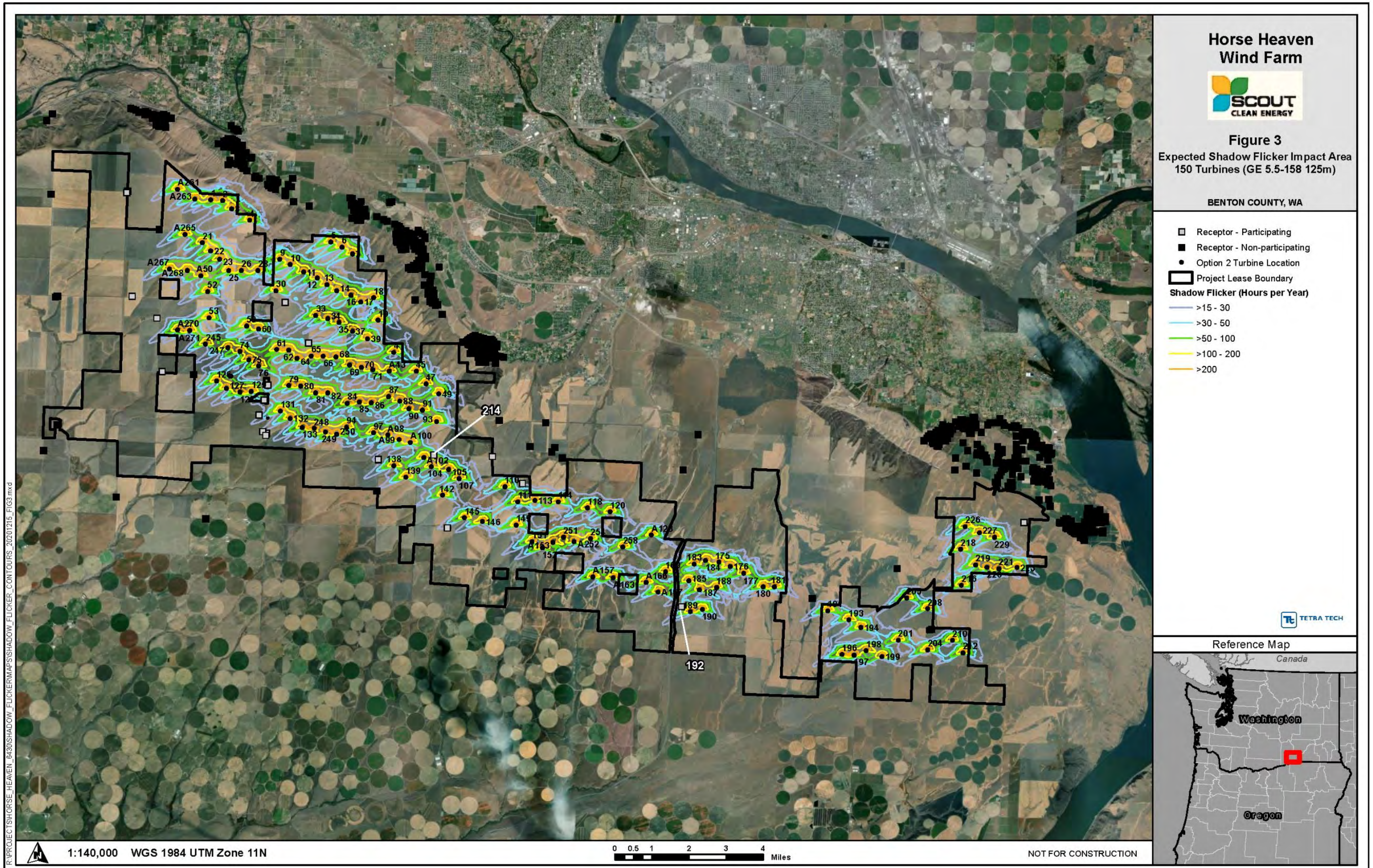
The proposed Project's maximum turbine blade pass frequency is approximately 0.79 Hz (i.e., less than one alternation per second), similar to Turbine Option 1. No negative health impacts on individuals with photosensitive epilepsy are anticipated.

Similar to Turbine Option 1, visual impacts from the resulting shadow flicker during operation of Turbine Option 2 would result in medium, long term, probable, confined impacts on receptors that have been identified as Project participants.

Light

Similar to Turbine Option 1, lighting from Turbine Option 2 operations would not result in a safety hazard or other significant adverse impact, though the design would be different. Option 2 consists of higher turbines, which require two red flashing lights to be affixed to the nacelle, positioned on opposite sides (FAA 2020). These lights would be affixed to 100% of the turbines for Turbine Option 2 (Kobus 2022). In summary, these light impacts would be low, long term, unavoidable, and local.

This Page Intentionally Left Blank



Source: Horse Heaven Wind Farm, LLC 2021c

Figure 4.10-10: Expected Shadow Flicker Impact Area Turbine Option 2 (GE 5.5-158 125m)

Solar Arrays

Visual Aspects

The Project would introduce forms, lines, colors, and textures associated with the solar arrays that are inconsistent with the existing landscape character. The conversion of existing agricultural lands to large expanses of photovoltaic panels would result in visual contrast through their flat, geometric forms and dark, slightly reflective surfaces, which are not common in the setting. The addition of the repetitive, vertical upright features associated with the solar trackers and additional fenced land would be noticeable in this rolling, panoramic landscape.

The Project would be visually prominent in the setting, resulting in medium to high impacts on landscape character. Based on the viewshed analysis presented in the Aesthetics Technical Memorandum (Horse Heaven Wind Farm, LLC 2021b), the County Well Road and Sellards Road siting areas would be the most visible options (see Figures 5 and 6 in Appendix 3.10-2 of this Draft EIS). These two Solar Siting Areas would affect a larger portion of the landscape than the other solar array siting option—45 percent for County Well Road and 51 percent for Sellards Road—within the 5-mile-wide area of analysis. The Solar Siting Areas would also occur in an area with a more intact existing landscape than the Bofer Canyon siting area, resulting in more intense impacts on landscape character. The Bofer Canyon option is located near the existing Nine Canyon Wind Project, which has introduced large-scale energy infrastructure into the landscape. The viewshed analysis found that 31 percent of the area within the 5-mile-wide area of analysis would be affected by the proposed solar arrays within the Bofer Canyon siting area (see Figure 7 in Appendix 3.10-2 of this Draft EIS).

Table 4.10-13 describes the impacts on views from the KOPs and other viewing locations associated with the three proposed Solar Siting Areas. In summary, activities during operation of any of the three solar array options would result in areas of (at minimum) medium, long term, unavoidable, regional impacts on visual resources, with the County Well Road and Bofer Canyon siting areas, resulting in areas of high, long term, unavoidable, local impacts as viewed from identified KOP locations.

Table 4.10-13: Key Observation Point/Viewpoint Impact Table – Solar Array

KOP #	Viewer Name	Viewer Type	Distance to Project	Viewer Position	Level of Visual Contrast[(a)]	Magnitude of Impact			Impact Description
						County Well Road Siting Area	Sellards Road Siting Area	Bofer Canyon Siting Area	
1	McNary NWR	Recreation	Not visible	Inferior	Slight	Negligible	Negligible	Negligible	Project elements associated with the three Solar Siting Areas would not be visually evident.
2	S Clodfelter Road – East, Central, and West	Residential	Not visible	Inferior	Slight	Negligible	Negligible	Negligible	Project elements associated with the three Solar Siting Areas would not be visually evident.
3	Chandler Butte	Recreation	2.1 miles	Superior	Moderate	Medium	Negligible	Negligible	Views of the County Well Road option would be unobstructed, with the Project being prominent and beginning to dominate views from this area. The contrast between the dark solar arrays and the tan grasses would be evident from this elevated viewing area approximately 2 miles away, resulting in medium, long term impacts on views.
4	I-82 South	Travel route	6.0 miles	Level	Moderate	Negligible	Negligible	Medium	The Bofer Canyon option would be prominent in view and would modify the existing landscape through the introduction of dark, geometric solar arrays in a rolling landscape comprising golden, tan grasses. The impacts on these views would incrementally increase as motorists drive on I-82 between this location and KOP 6 (approximately 10 miles), with some views of the solar arrays being intermittently screened by topography. From this location, the Project would result in medium, long term impacts on views.

Table 4.10-13: Key Observation Point/Viewpoint Impact Table – Solar Array

KOP #	Viewer Name	Viewer Type	Distance to Project	Viewer Position	Level of Visual Contrast[(a)]	Magnitude of Impact			Impact Description
						County Well Road Siting Area	Sellards Road Siting Area	Bofer Canyon Siting Area	
5	Badger Mountain	Recreation	Not visible	Level	Slight	Negligible	Negligible	Negligible	Project elements associated with the three Solar Siting Areas would not be visually evident.
6	Bofer Canyon Road/I-82	Travel route	0.6 mile	Level	Strong	Negligible	Negligible	High	The Bofer Canyon option would be visually dominant and demand attention within the setting as the solar arrays would be located on both sides of I-82. An existing transmission line has modified the existing landscape, including the introduction of strong vertical lines. The contrast between the dark solar arrays and the tan grasses would be highly evident. In consideration of the existing modifications in view, the Project would result in medium, long term impacts on views from this location. These impacts would continue to increase as viewers would pass the existing transmission line into an area where views of the proposed solar arrays would be highly prominent as viewed both to the east and west resulting in high, long term local impacts.
7	Highway 221	Travel route, residential	3.1 miles	Level	Weak	Low	Low	Negligible	The County Well Road and Sellards Road options would attract some attention but would be visually subordinate in the setting. The low form of the solar arrays would blend with the existing landscape from this distance (approximately 3 to 4 miles) and would be partially screened by topography and existing structures. The Project would result in low, long term impacts on views.

Table 4.10-13: Key Observation Point/Viewpoint Impact Table – Solar Array

KOP #	Viewer Name	Viewer Type	Distance to Project	Viewer Position	Level of Visual Contrast[(a)]	Magnitude of Impact			Impact Description
						County Well Road Siting Area	Sellards Road Siting Area	Bofer Canyon Siting Area	
8	Kennewick (Canyon Lakes Area) – South and West	Residential	5.9 miles	Inferior	Slight	Negligible	Negligible	Negligible	Project elements associated with the three Solar Siting Areas would not be visually evident.
9	Benton City	Residential, travel route, commercial	3.9 miles	Inferior	Slight	Negligible	Negligible	Negligible	Project elements associated with the three Solar Siting Areas would not be visually evident.
10	Badger Road	Residential, travel route	6.4 miles	Inferior	Slight	Negligible	Negligible	Negligible	Project elements associated with the three Solar Siting Areas would not be visually evident.
11	Highland/ Finley Area	Residential	8.5 miles	Inferior	Slight	Negligible	Negligible	Negligible	Project elements associated with the three Solar Siting Areas would not be visually evident.
12	County Well Road[(b)]	Residential, travel route	0.2 miles	Level	Strong	High	Negligible	Negligible	The County Well Road option would be prominent in the view and would modify the existing landscape through the introduction of dark, geometric solar arrays in a flat to rolling landscape comprising tan-colored agricultural fields. An existing transmission line has already modified the landscape, including the introduction of strong vertical lines and geometric forms. In consideration of the existing modifications in view, the Project would result in medium, long term impacts on views from this location. These impacts would continue to increase as viewers would pass the existing transmission line into an area where views of the proposed solar arrays would be highly prominent, resulting in high, long term, local impacts.

Table 4.10-13: Key Observation Point/Viewpoint Impact Table – Solar Array

KOP #	Viewer Name	Viewer Type	Distance to Project	Viewer Position	Level of Visual Contrast[(a)]	Magnitude of Impact			Impact Description
						County Well Road Siting Area	Sellards Road Siting Area	Bofer Canyon Siting Area	
13	Travis Road South of Sellards Road	Residential, travel route	1.0 mile	Level	Moderate	Negligible	Medium	Negligible	The Sellards Road option would be prominent in the view and would modify the existing landscape through the introduction of dark, geometric solar arrays in a rolling landscape comprising tan-colored agricultural fields (note: visual simulation in the ASC does not include these views to the west). The views from this area are generally intact, with views of the Project occurring away from the direction of travel along the road. Views of the Project would therefore be short in duration. In consideration of view duration and partial screening by existing topography, the Project would result in medium, long term impacts on views from this location.
N/A	Horse Heaven Hills Recreation Area	Recreation	Not visible	Inferior	Slight	Negligible	Negligible	Negligible	Project elements associated with the three Solar Siting Areas would not be visually evident.

Notes:

(a) Level of visual contrast indicated here refers to the solar siting area(s) where a low, medium, or high magnitude of impact was identified in subsequent columns. For alternatives where a “negligible” magnitude of impacts was identified, the proposed solar arrays would not be readily seen from those KOP locations.

(b) Views from dispersed residences within the foreground distance zone (0 to 0.5 miles) were analyzed from KOP 12.

ASC = Application for Site Certification; KOP = key observation point; N/A = not applicable; NWR = National Wildlife Refuge

Light

Once constructed, external lighting supporting the solar arrays would be limited to security lighting. Security lighting would be directed downward and shielded to avoid nighttime sky glow and light trespass effects. This type of exterior lighting would be consistent with other similar sources of light in the area such as the existing Bonneville Power Administration substation and rural residential development, as well as the adjacent Nine Canyon Wind Farm facility.

Light levels during Project operation are anticipated to increase by a minor amount. Typical new Leadership in Energy and Environmental Design (LEED) certified building exterior lighting can account for a vertical and horizontal illuminance value no greater than 0.1 lux (15.1 as a sky glow reading) at the property boundary. A recent study completed for the U.S. Department of Energy found that the luminescence of light-emitting diode (LED) streetlights can increase sky glow 0.2 to 1.6 times the baseline sky glow for nearby receptors (DOE 2017). Assuming a conservative existing conditions classification of E2, the increase in sky glow of this magnitude would not be expected to change the ELZ classification from E2 to E3.

This suggests that there will be a minor change to the existing level of sky glow due to Project-related lighting. The ELZs for all light receptors are predicted to remain within their current classifications and would not change as a result of Project operation. As such, lighting from the Project during operations would be a minor contributor to light levels and is not anticipated to change the overall existing light environment during nighttime viewing. In summary, the impacts from lighting would be low, long term, unavoidable, and local.

Glare

The preliminary Project layout for the solar arrays was modeled using GlareGauge to evaluate the potential extent of glare the Project may cause for receptors at several KOPs and segmented traffic routes representing proximal areas surrounding the Project.

To better analyze the potential for glare as a result of sunlight reflectance from the Project and accommodate GlareGauge conservative assumptions noted in the Glare Analysis Report, 60 solar array areas were modeled within the Project layout, which was broken down into three separate areas: Solar Array County Well (West 1), Solar Array Sellards (West 2), and Solar Array East (East) (Horse Heaven Wind Farm, LLC 2021c). These three areas are presented in **Figures 4.10-11, 4.10-12, and 4.10-13**, respectively. Eight separate glare analyses (i.e., Analysis 1 through Analysis 8) were performed to provide a quantitative assessment of the potential for glare as a result of the Project, based on views from first- and second-story structures, and commuter and commercial vehicles (Horse Heaven Wind Farm, LLC 2021c).

Based on the SGHAT results, all of the modeled receptors (KOPs and vehicular routes) are predicted to not experience glare as a result of the Project. As previously noted, the GlareGauge model does not account for varying ambient conditions (e.g., cloudy days, precipitation), atmospheric attenuation, screening due to existing topography not located within the defined array layouts, or existing vegetation or structures (including fences or walls), nor does the tool allow proposed landscaping to be included; therefore, the predicted results are considered to be conservative.

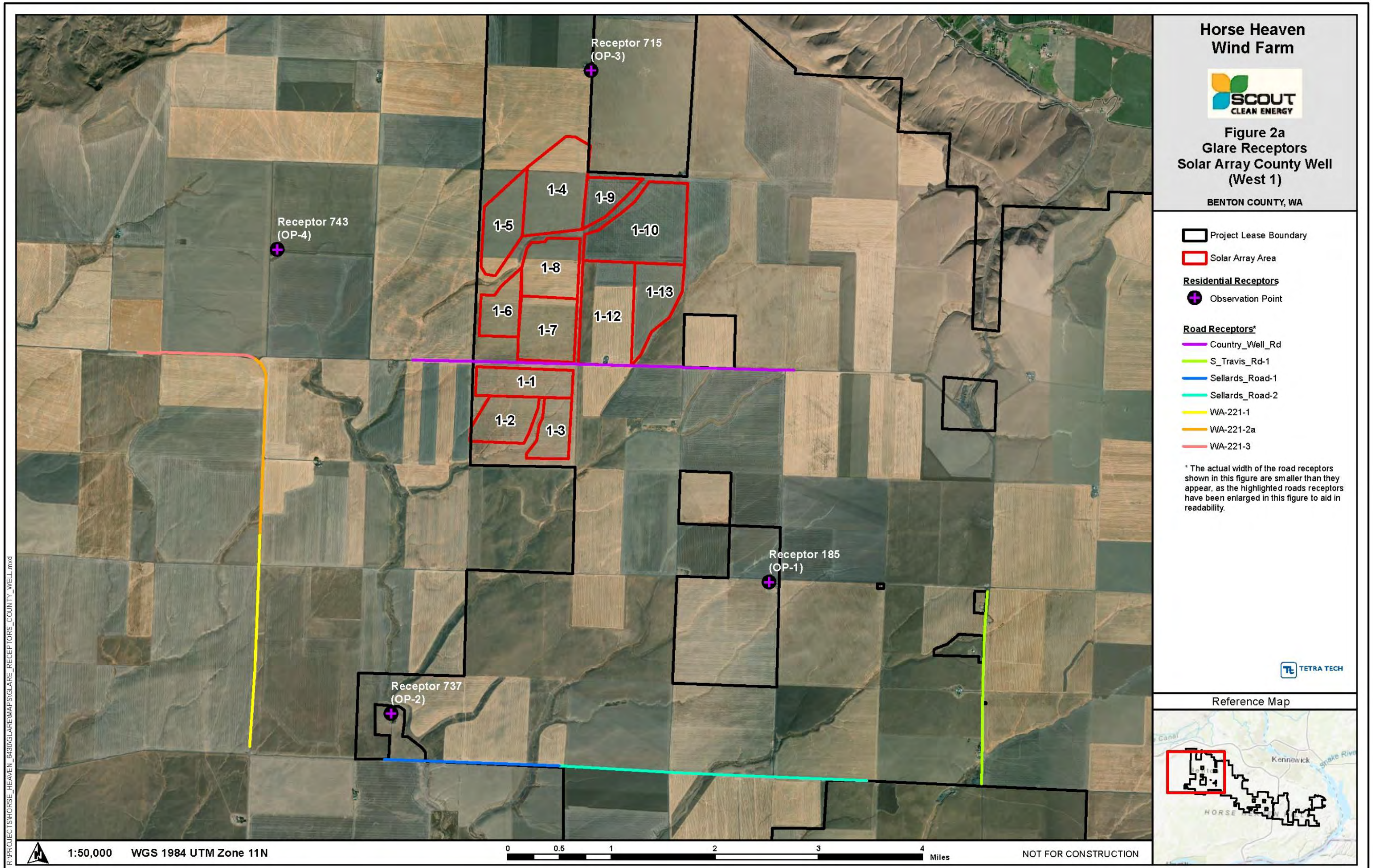
As noted in Section 3.10, the FAA has developed the following criteria for analysis of solar energy projects located on jurisdictional airports (78 Federal Register 63276):

1) No potential for glint or glare in the existing or planned air traffic control tower cab; and

2) No potential for glare or "low potential for after-image" along the final approach path for any existing landing threshold or future landing thresholds (including any planned interim phases of the landing thresholds) as shown on the current FAA-approved Airport Layout Plan.

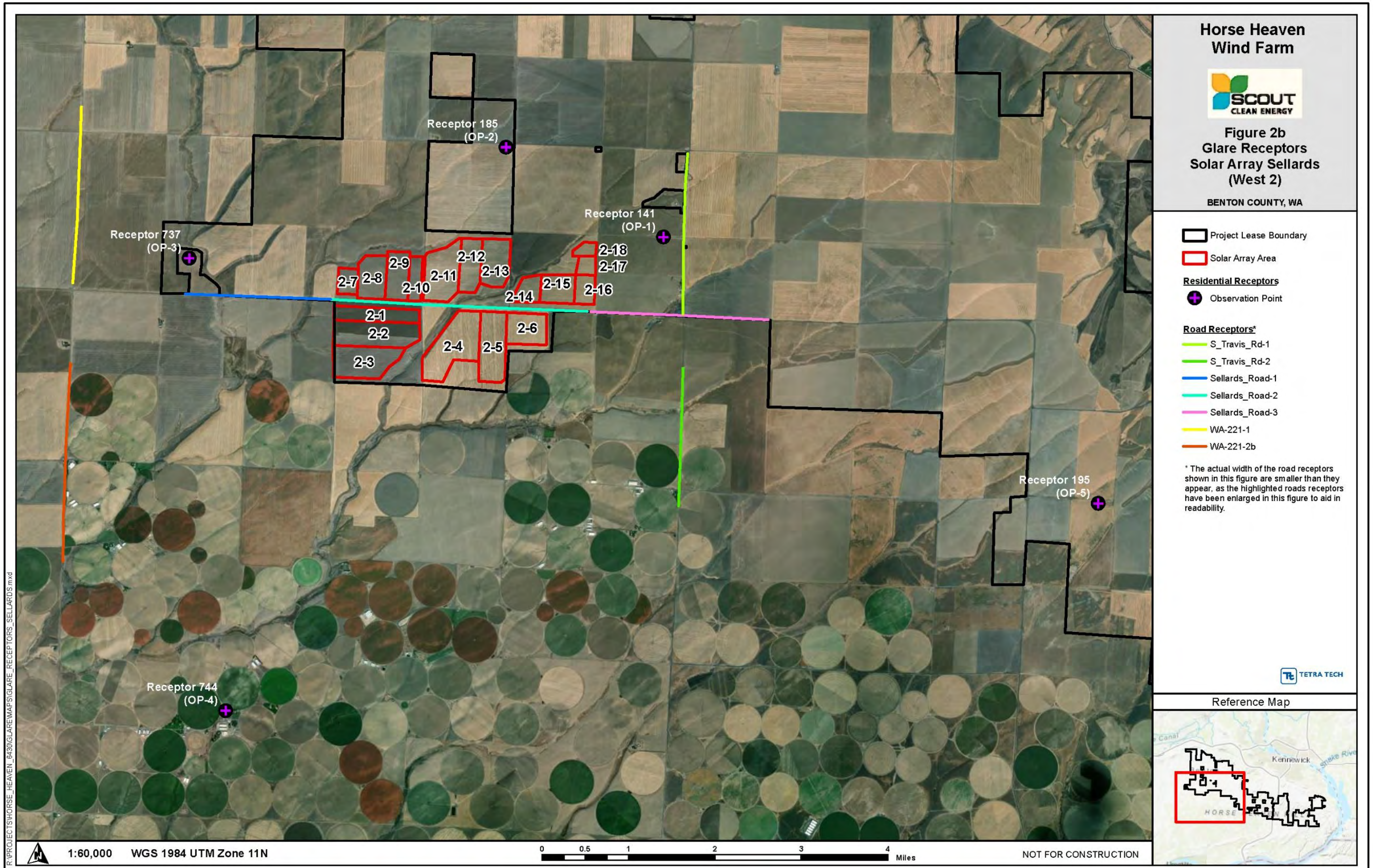
Based on the results of the FAA Notice Criteria Tool, the Project would not exceed notice criteria, so a formal filing is not necessary, and the impacts from glare would be low, long term, unavoidable, and confined.

This Page Intentionally Left Blank

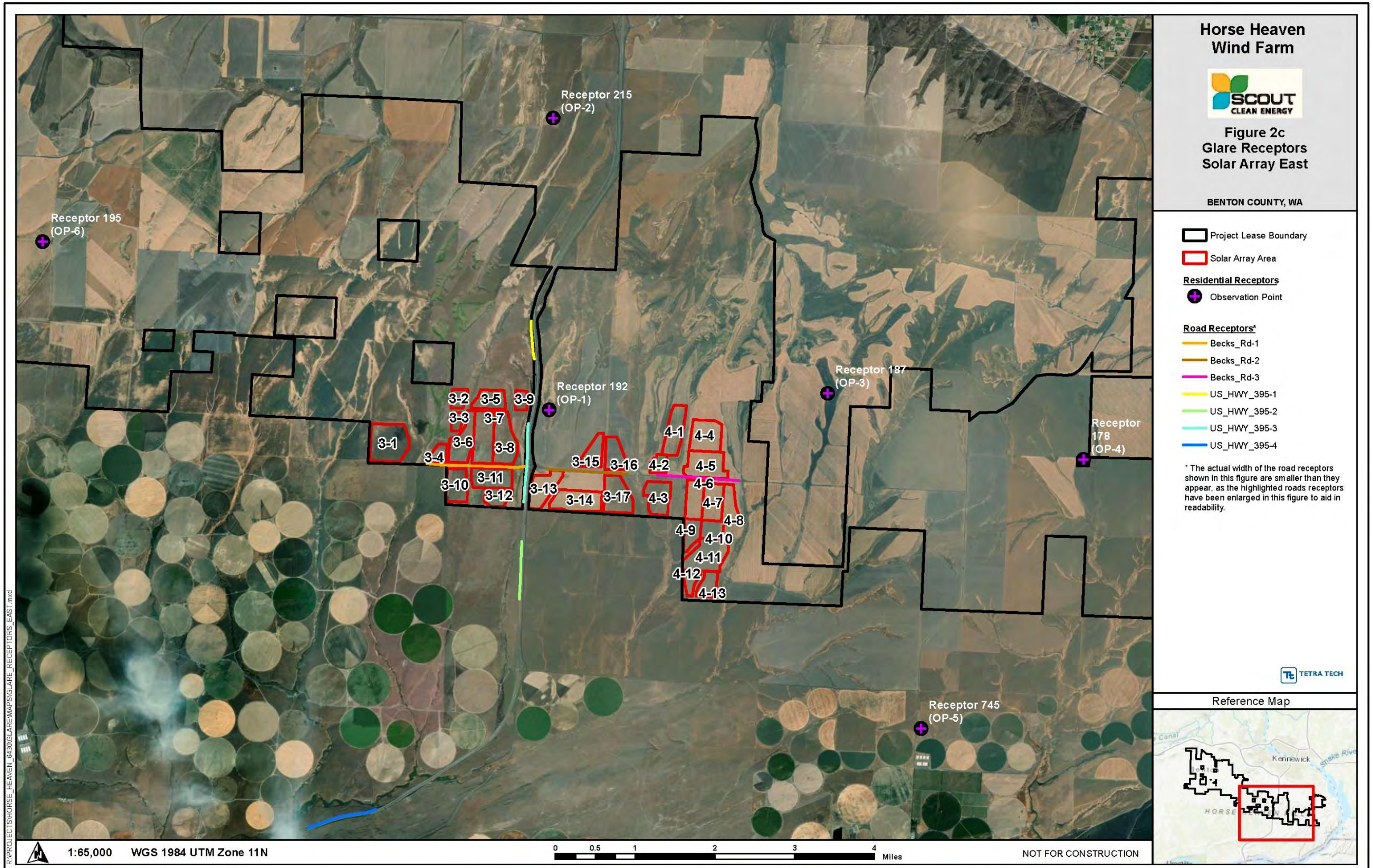


Source: Horse Heaven Wind Farm, LLC 2021d

Figure 4.10-11: Glare Receptors Solar Array County Well (West 1)



Source: Horse Heaven Wind Farm, LLC 2021d
Figure 4.10-12: Glare Receptors Solar Array Sellards (West 2)



Source: Horse Heaven Wind Farm, LLC 2021d

Figure 4.10-13: Glare Receptors Solar Array East

Battery Energy Storage Systems

Visual Aspects

Each proposed BESS would introduce a flat, rectangular, geometric form associated with its proposed yard, similar to the proposed substations, with equipment contained in geometric shipping containers (stacked up to 40 feet tall). These proposed features would contrast with the existing rolling agrarian landscape character as their flat-topped geometric form, and close grouping (adjacent to the project substations), would be inconsistent with adjacent agricultural structures.

In general, the proposed BESSs would not attract attention from most locations within the area of analysis. The introduction of the proposed BESSs into views from KOPs 6 and 12, which have already been modified by an existing transmission line, would result in long term, medium impacts on views from 1.2 miles and 0.5 miles away, respectively. The geometric form of the proposed BESSs, including the vertically stacked rectangular containers, would attract attention but would be co-dominant with the existing modifications. Views from KOPs 3, 4, and 7 would be minimally modified by the BESSs as views would occur from approximately 2.7 to 7.3 miles away, where the Project would mostly blend with the existing landscape setting. The geometric form of the BESSs from these three KOPs would appear in scale with the existing landscape from these more distant viewpoints.

The proposed BESSs would not be visible from KOPs 1, 2, 5, 8, 9, 10, 11, or 13, or the Horse Heaven Hills Recreation Area; therefore, these Project components would have no impact on these views (see Appendix 3.10-2). Overall, activities during operation of the BESSs would result in medium, long term, unavoidable, local impacts on visual resources.

Light

BESSs would have security lighting similar to the solar arrays and would have similar impacts—low, long term, unavoidable, and local.

Substations and Transmission Lines

Visual Aspects

The proposed substations would introduce a flat, rectangular, geometric form associated with the substation yard and tall, vertical, geometrical substation equipment. These industrial features would contrast with the existing rolling agrarian landscape character. Where located adjacent to existing transmission lines or substations, the proposed elements would be in scale and consistent with the landscape setting, but in areas where there are limited existing utilities, the proposed substations would alter the landscape setting and would be visually prominent.

In general, the proposed substations would not attract attention from most locations within the area of analysis. The introduction of the proposed substations into views from KOPs 6 and 12, which have been modified by an existing transmission line, would result in long term, medium impacts on views from 1.2 miles and 0.5 miles away, respectively. The geometric form of the proposed substation yard and vertical structures would attract attention but would be co-dominant with the existing modifications in the landscape. Views from KOPs 3, 4, and 7 would be minimally modified by the proposed substations as views would occur from approximately 2.7 to 7.3 miles away, where the Project would mostly blend with the existing setting. The geometric form of the substation and vertical protrusions would appear in scale with the existing landscape from these more distant viewpoints.

The proposed substations would not be visible from KOPs 1, 2, 5, 8, 9, 10, 11, or 13, or the Horse Heaven Hills Recreation Area; therefore, this Project component would have no impacts on these views (see Appendix 3.10-2).

The proposed transmission lines would modify the existing landscape character through the introduction of repeating vertical transmission line structures, associated linear access roads, and associated vegetation clearing. These effects would be most apparent where there are no adjacent existing transmission lines or other vertical protrusions (e.g., communication towers, substations, etc.) and would result in long term impacts on landscape character.

Impacts on viewers from proposed transmission lines would vary from high to low. The highest impacts would occur on the views from three KOP locations (KOPs 6, 12, and 13) located within 2 miles of the proposed transmissions lines. Views from KOP 6 have been modified by an existing transmission line, with the introduction of the proposed transmission line resulting in medium, long term impacts from approximately 1.2 miles away. The form of the existing transmission line would be repeated by the Project (H-frame structures), reducing potential landscape clutter, and would be sited further away than the existing transmission line. Therefore, the Project would attract attention but would be co-dominant with the existing modifications.

The proposed transmission facilities would begin to dominate views from KOP 12, where an existing transmission line crosses the road and the Project parallels the road with a series of transmission line structures stretching to the horizon. Due to the head-on view of the proposed transmission line and its difference in design compared to the existing line, the Project would result in medium, long term impacts at this location. Views from KOP 13 would be highly impacted by the proposed transmission line. From this location, there are limited existing modifications in view, with the existing landscape setting appearing mostly intact. The Project would dominate these unobstructed views through the introduction of tall transmission line structures viewed as skylined above the low, rolling terrain.

The proposed transmission lines would not be visible from KOPs 1 or 5, or the Horse Heaven Hills Recreation Area; therefore, this Project component would have no impacts on these views. Impacts on views, resulting from the introduction of the proposed transmission lines would be low in magnitude from KOP 2, 3, 4, 7, 8, 9, 10, and 11 due to the viewing distance (more than 2 miles away).

In summary, during operation, the transmission lines would result in areas of high, long-term, unavoidable, local impacts, as well as medium, long-term, unavoidable, regional impacts on visual resources. During operation, the substations would also result in medium, long-term, unavoidable, regional impacts on visual resources.

Light

Substations would have security lighting similar to the solar arrays and would have similar impacts—low, long term, unavoidable, and local. No lighting for security or to satisfy FAA requirements is expected for the transmission lines.

Comprehensive Project

Visual Aspects

In consideration of the CESA methods and the Washington Energy Facility Site Evaluation Council (EFSEC) site certification process, the Project was assessed as it relates to compliance with state and local visual management requirements. The Project analysis presented in this section would comply with WAC 463-60-362(3), which establishes the requirements for a visual resource analysis as part of the site certification process. Specifically, this analysis describes the aesthetic impacts of the proposed Project, shows its location relative to physical features of the site, and outlines procedures to restore or enhance the landscape disturbed during construction (see Section 4.10.2.4 for proposed mitigation measures, and the Applicant’s ASC, including the Revegetation and

Noxious Weed Management Plan (Horse Heaven Wind Farm, LLC 2021a; Appendix N) and an Initial Site Restoration Plan to be submitted to EFSEC prior to construction if the Project is approved.

The Benton County Comprehensive Plan identified a planning goal to conserve the visually prominent naturally vegetated steep slopes and elevated ridges that define the Columbia Basin landscape, which are uniquely a product of ice age floods. The planning policy further states that the County should "consider the preservation of the ridges and hillside areas through various development regulations" and "pursue a variety of means and mechanisms…to protect the natural landform and vegetative cover of the Rattlesnake uplift formation, notably Rattlesnake, Red, Candy, and Badger mountains and the Horse Heaven Hills" (Benton County 2022). Since these lands have not been placed into Open Space Conservation or other types of conservation, and there are no specific policies to protect the landscapes impacted by the Project, the Project would technically be in compliance with this aspect of the county plan. The Horse Heaven Hills and northern ridgeline would, however, become dominated by energy infrastructure, with potential long duration views from areas within the communities between Benton City and Kennewick. These impacts on views would be most intense where unobstructed views of a large number of turbines occur.

The combined impacts of the different Project components would result in a landscape character dominated by large-scale energy infrastructure, including wind turbines, solar arrays, collector lines, access roads, multiple transmission lines and substations, the O&M facility, and the BESS. The existing setting does include a smaller wind farm and two existing transmission lines, but the scale of the Project and prominence of the proposed turbines would result in high, long term impacts on the existing landscape.

Views from most residences and other KOP locations would primarily be impacted by the presence of the large, moving proposed wind turbines. The turbines would attract attention and, depending on the extent of their viewshed modified by the turbines, could dominate views as described in **Tables 4.10-9 and 4.10-11**. In addition, some viewers, such as those associated with KOPs 3, 6, 12, and 13, would have views of multiple Project components, introducing additional variety and visual clutter into these views as shown in the visual simulations (ASC [Horse Heaven Wind Farm, LLC 2021c]). Views from these locations would be dominated by energy infrastructure, as a result of the additive effects from each Project component, which would result in high, long term impacts. Since these impacts would occur on viewpoints beyond the neighboring receptors, these effects would be regional in extent. In summary, activities during operation of all components of the Project would result in high, long term, unavoidable, regional impacts on visual resources.

Shadow Flicker

The comprehensive impact of shadow flicker relates only to turbines under both turbine options. Shadow flicker during operation under both Turbine Option 1 and Turbine Option 2 would result in medium, long term, probable, confined impacts on visual receptors that have been identified as Project participants.

Light

The combined impacts of the different Project components would result from the addition of FAA lighting across the Lease Boundary and the addition of security lighting near solar arrays, substations, and BESSs. The FAA-required lighting is expected to be visible outside of the Project vicinity but would not add light trespass or increase sky glow. The security lighting at the solar arrays, substations, and BESSs would be directed downward and shielded to limit off-site impacts and degradation of sky glow, and the resulting impacts are expected to be similar to those of existing light sources used for agricultural or residential security lighting, which are low, long term, unavoidable, and local.

Glare

The Project components combined would result in low-glare impacts on the public and on flights to and from local airports. Glare impacts would result primarily from the solar arrays, and glare modeling analysis indicates that the surrounding observation points and vehicle routes would not experience glare as a result of the Project (Horse Heaven Wind Farm, LLC 2021c). The glare analysis also found that the Project would not create any glare effects that could impact jurisdictional airports. The predicted glare at these receptors is considered to be a conservative representation as the modeling tool does not consider conditions or obstacles between the solar arrays and the receptors, such as vegetative screening (existing or planted), buildings, topography, etc. that would minimize glare.

For the reasons described above, glare from operation of the Project would have low, long term, unavoidable, and confined impacts.

4.10.2.3 Impacts during Decommissioning

The decommissioning and removal of the Project and its components would have impacts similar to those of the construction process. The decommissioning process would result in increased motion associated with construction equipment, short term impacts from dust generation, and landform modification to more closely match preconstruction conditions. Additionally, light and glare associated with construction equipment operations would produce light and glare impacts similar to those of the construction stage. The removal of Project components would likely require additional ground disturbance and vegetation clearing, resulting in reclamation efforts similar to those conducted after the construction process was completed. The restoration of vegetation in these areas would take a number of years to fully establish, but over time the landscape impacted by the Project would begin to more closely resemble preconstruction conditions. A summary of impacts during decommissioning is provided in **Table 4.10-14c**. The following discussion presents a detailed analysis based on component and the comprehensive project.

Turbine Option 1

Visual Aspects

Impacts during decommissioning under Turbine Option 1 would be similar to those resulting from the construction of the Project, including the movement of vehicles attracting attention. Viewers located within the foreground distance zone (0 to 0.5 miles) or in locations where views would be occupied by large portions of the Project being decommissioned, would experience increased visual contrast in these views. These impacts would be short in duration and would cease after removal of the Project is complete and vegetation has been re-established. Decommissioning activities under Turbine Option 1 would result in medium, short term, probable, local impacts on visual resources.

Light

The Proposed Action would generate minimal light during the decommissioning of Turbine Option 1 from vehicles and equipment. Decommissioning work would be concentrated during daylight hours, minimizing the potential need for temporary nighttime lighting. Therefore, lighting impacts from decommissioning under this option would be negligible, temporary, unlikely, and limited.

Glare

Similar to lighting, the Proposed Action would generate minimal glare during the decommissioning under Turbine Option 1 from vehicle and equipment windshields or glass enclosures. Therefore, glare from decommissioning under this option would have impacts that are low, temporary, feasible, and confined.

Turbine Option 2

Visual Aspects

Decommissioning under Turbine Option 2 would have impacts similar to Turbine Option 1 except that it would have fewer wind turbines, requiring fewer roads and other supporting facilities to be removed. This would result in slightly reduced visual contrast and modifications to the existing landscape introduced during Project decommissioning. Decommissioning activities under Turbine Option 2 would result in medium, short term, probable, local impacts on visual resources.

Light

The Proposed Action would generate minimal light during decommissioning under Turbine Option 2 from vehicles and equipment. Decommissioning work would be concentrated during daylight hours, minimizing the potential need for temporary nighttime lighting. Therefore, lighting impacts from decommissioning under this option would be negligible, temporary, unlikely, and limited.

Glare

Similar to lighting, the Proposed Action would generate minimal glare during decommissioning under Turbine Option 2 from vehicle and equipment windshields or glass enclosures. Therefore, glare from decommissioning is expected to have impacts that are low, temporary, feasible, and confined.

Solar Arrays

Visual Aspects

Visual impacts resulting from decommissioning of the solar arrays would be similar to construction, which would be focused within the selected Solar Siting Areas. Within the fenced boundaries, all lands would be restored to more closely match preconstruction conditions, including revegetation of the site. Decommissioning activities for the solar arrays would result in low, short term, probable, local impacts on visual resources.

Light

The Proposed Action would generate minimal light during decommissioning of the solar arrays from vehicles and equipment. Decommissioning work would be concentrated during daylight hours, minimizing the potential need for temporary nighttime lighting. Therefore, lighting impacts from decommissioning of this Project component are expected to be negligible, temporary, unlikely, and limited.

Glare

Similar to lighting, the Proposed Action would generate minimal glare during decommissioning of the solar arrays from vehicle and equipment windshields or glass enclosures. Some glare would occur for a short time after operation ends and before the panels are removed. Therefore, glare from decommissioning of this Project component is expected to have impacts that are low, temporary, feasible, and confined.

Battery Energy Storage Systems

Visual Aspects

Impacts would be similar to the construction of the Project with the removal of the BESS containers and reclamation of those sites. This would include additional motion from construction equipment and associated dust during those activities. As described for other components, vegetation restoration would occur in these disturbed areas, and the landscape would begin to more closely resemble preconstruction conditions. Decommissioning activities for the BESSs would result in low, short term, probable, local impacts on visual resources.

Light

The Proposed Action would generate minimal light during the decommissioning of the BESSs from vehicles and equipment. Decommissioning work would be concentrated during daylight hours, minimizing the potential need for temporary nighttime lighting. Therefore, lighting impacts from decommissioning this Project component are expected to be negligible, temporary, unlikely, and limited.

Glare

Similar to lighting, the Proposed Action would generate minimal glare during decommissioning of the BESSs from vehicle and equipment windshields or glass enclosures. Therefore, glare from decommissioning is expected to have impacts that are low, temporary, feasible, and confined.

Substations and Transmission Lines

Visual Aspects

Impacts of decommissioning both the proposed substations and transmission lines are expected to be similar to those of constructing these Project components. The removal of the tall, vertical structures associated with both components would result in additional motion from construction equipment, structure dismantling, and conductor removal. As described for other components, vegetation restoration would occur in these disturbed areas, and the landscape would begin to more closely resemble preconstruction conditions. Decommissioning activities for the substations and transmission lines would result in low, short term, probable, local impacts on visual resources.

Light

The Proposed Action would generate minimal light during decommissioning of the substations and transmission lines from vehicles and equipment. Decommissioning work would be concentrated during daylight hours, minimizing the potential need for temporary nighttime lighting. Therefore, lighting impacts from decommissioning this Project component are expected to be negligible, temporary, unlikely, and limited.

Glare

Similar to lighting, the Proposed Action would generate minimal glare during decommissioning of the substations and transmission lines from vehicle and equipment windshields or glass enclosures. Therefore, glare from decommissioning is expected to have impacts that are low, temporary, feasible, and confined.

Comprehensive Project

Visual Aspects

During Project decommissioning, there would be short term impacts from these activities, which would occupy a large portion of the landscape and include removal of wind turbines, solar arrays, the O&M facility, transmission lines, BESSs, and substations, as well as the reclamation of access roads, turbine pads, and other areas disturbed during construction and operation of the Project. These activities would include views of additional vehicular traffic, as well as areas of exposed soil after the removal of vegetation and during earthwork activities, prior to site reclamation efforts. The removal of vegetation would be noticeable in the setting and would contrast with the existing character; however, over time, as vegetation is re-established in the area, it would begin to repeat vegetation patterns common in the area.

Viewpoints and KOPs located within the foreground distance zone (0 to 0.5 miles) would be most impacted by decommissioning, particularly where a large portion of their viewshed would be occupied by decommissioning multiple Project components simultaneously. Overall, activities during decommissioning of all components of the Project would result in medium, short term, probable, regional impacts on visual resources.

Light

The Proposed Action would generate minimal light during the decommissioning process from vehicles and equipment. Decommissioning work would be concentrated during daylight hours, minimizing the potential need for temporary nighttime lighting. Therefore, lighting impacts from decommissioning the Project components combined are expected to be negligible, temporary, unlikely, and limited.

Glare

Similar to lighting, the Proposed Action would generate minimal glare during the decommissioning process from vehicle and equipment windshields or glass enclosures. Glare from solar panels during removal will cause glare for a short time after operation ends and before panels are removed. Therefore, glare from decommissioning is expected to have impacts that are low, temporary, feasible, and confined.

4.10.2.4 Applicant Commitments and Identified Mitigation

This section describes measures that would reduce or compensate for impacts related to visual aspects, light, and glare from construction, operation, and decommissioning of the Project. These measures would be implemented in addition to compliance with the environmental permits, plans, and authorizations required for the Proposed Action.

Applicant Commitments

The Applicant has identified measures and/or best practices that are designed to prevent or minimize potential impacts on the affected environment for the Project. Measures presented by the Applicant in the ASC (Horse Heaven Wind Farm, LLC 2021a) and taken into consideration in the characterization of potential impacts on visual resources are discussed in Section 2.3 and summarized below.

Visual Aspects

To reduce impacts on landscape character and views and to minimize any incompatibility with state and local visual management requirements, the Applicant has developed a series of BMPs and other mitigation measures as part of the Project ASC. Many of these BMPs, as well as the design of the Project, incorporate mitigation measures outlined in the BLM's Best Management Practices for Reducing Visual Impacts of Renewable Energy Facilities on BLM-Administered Lands (BLM 2013) and CESA's visual impact assessment process (CESA 2011), including (but not limited to) the following:

- Considering topography when siting wind turbines, including less rigid turbine configurations in rolling terrain responding to local topography
- Clustering or grouping turbines to break up long lines of turbines

- Striving to create visual order and unity among turbine clusters
- Maintaining operational turbines and other Project components
- Preparing an effective decommissioning plan
- Selecting appropriate paint and finish to match the existing setting

The impacts assessment also includes two different turbine options to compare one design that includes a larger number of smaller turbines (Option 1) to a design with fewer, taller turbines (Option 2). Due to the siting and operating requirements for wind turbines, there are limited mitigation measures that would considerably reduce impacts on visual resources beyond reducing the number of turbines in view. The use of the following Applicant-committed mitigation in the Project design, construction, operation, and decommissioning stages would both directly and indirectly reduce impacts on visual resources:

- Active dust suppression would be implemented during construction.
- Following completion of construction, temporarily disturbed areas (e.g., laydown yards, crane paths not used as Project access roads) would be returned to their previous conditions once construction is complete.
- Restoration of the laydown yards would involve preconstruction stripping and storing of topsoil (including weed avoidance), removing the gravel surface, regrading to preconstruction contours, restoring topsoil and de-compacting subsoils as needed, and reseeding with approved seed mixes.
- Following completion of construction, the temporary crane paths would be removed and the area restored in accordance with the Project's Revegetation and Noxious Weed Management Plan.
- The Applicant would provide a clean-looking facility free of debris and unused or broken-down equipment by storing equipment and supplies in designated areas within the O&M facilities and promptly removing damaged or unusable equipment from the site.
- The turbines and solar arrays would be uniform in design to present a trim, uncluttered, aesthetically attractive appearance.
- The Applicant would construct support facilities with non-reflective materials in muted tones and would use white or light gray, non-reflective paint to minimize the need for daytime aviation lighting and eliminate glare from the turbines.

Shadow Flicker

The Applicant has not proposed any mitigation measures for shadow flicker.

Light

For the security lighting for the solar arrays, substations, and BESSs, the Applicant has committed to using the following:

- During construction, to the extent feasible, lighting would be directed toward construction activities and away from roadways or residences.
- Sensors and switches would be used to keep security lighting turned off when not required.
- All lights except aviation safety lighting would be hooded and directed downward to minimize light pollution.

- Any perimeter lighting at the O&M facilities and BESSs would be activated only during maintenance or emergency activities at night.

Glare

The Applicant has committed to the following:

- The turbine towers would be painted off-white with a non-reflective coating, in accordance with FAA regulations.
- Solar arrays would have an anti-reflection coating.

Recommended Mitigation Measures

Visual Aspects Mitigation

EFSEC has identified the following additional and modified mitigation measures for the Project to avoid and/or minimize potential impacts on visual resources, adapted from BLM (2013) and CESA (2011):

- Wind turbines:
  - **VIS-1[30]:** Relocate turbines located within the foreground distance zone (0 to 0.5 miles) of non-participating residences to avoid completely dominating views from these highly sensitive viewing locations. Siting the turbines further away would reduce the level of visual contrast and prominence (CESA 2011; BLM 2013).
  - **VIS-2:** Do not place piggyback advertising, cell antennas, commercial messages, or symbols on proposed wind turbines, as these have the potential to introduce additional visual contrast and would seem out of place in this natural-appearing agricultural landscape (BLM 2013).
  - **VIS-3:** Maintain clean nacelles and towers to avoid any spilled or leaking fluids accumulating dirt, which would contrast with the clean, white/gray wind turbines and result in increased visual contrast within the landscape (BLM 2013).
- Solar arrays:
  - **VIS-4:** Use color-treated solar collectors and support structures to minimize color contrast with the existing landscape (BLM 2013).
  - **VIS-5:** Avoid complete removal of vegetation beneath solar arrays during construction, where possible, to reduce contrast between the exposed soil and adjacent undisturbed areas during project operation. If site grading requires the removal of vegetation, the area will be revegetated and maintained during project operation (BLM 2013).
  - **VIS-6:** Install opaque fencing to directly screen views of the solar arrays where sited adjacent to viewpoints or residences. To allow the proposed fencing to blend into the setting, color-treat the fencing to minimize color contrast with the existing landscape (BLM 2013).
- Battery Energy Storage System:

[30] Vis-: Identifier of numbered mitigation item for Visual Aspects

- **VIS-7:** Design BESS to blend with the adjacent agricultural character, including selecting materials and paint colors to reduce contrast with the existing setting. By mimicking design characteristics of agricultural structures in the area, the BESS facilities would appear consistent with the area's agricultural setting, including the overall visual scale of those existing structures (BLM 2013).

- Substation and transmission lines:
  - **VIS-8:** Maximize the span length across highways and other linear viewing locations to decrease visual contrast at the highway crossings. By moving the structures as far from the road as possible, the effect of those structures being located directly adjacent to these linear viewing locations would be reduced (BLM 2013).
  - **VIS-9:** Choose the type of proposed transmission structure (H-frame or monopole) to best match the adjacent transmission lines and to minimize visual clutter from the introduction of different structure types into the landscape, which would result in increased visual contrast (BLM 2013).

Application of the above mitigation measures would incrementally reduce visual contrast, but based on the scale of the Project, including the height of the proposed wind turbines, these measures would not effectively reduce identified levels of contrast or degrees of impact magnitude.

Shadow Flicker Mitigation

EFSEC has identified the following additional mitigation measure for the Project to avoid and/or minimize potential impacts from shadow flicker:

SF-1[31]: The Applicant would attempt to avoid, minimize, and mitigate shadow flicker at nearby residences. Shadow flicker can usually be addressed by planting trees, shading windows, or other mitigation measures. As a last resort, the control system of the wind turbine could be programmed to stop the blades during the brief periods when conditions result in a perceptible shadow flicker.

SF-2: The Applicant would set up a complaint resolution procedure that will include the following: 1) A 24-hour "hot line" or other form of communication that the public can use to report any undesirable shadow flicker associated with the operation of the wind turbines, with the ability to log the date and time of a complaint. This line of communication would be maintained for at least one year, at which time it could be reassessed to continue or be terminated; 2) An attempt to contact the complainant within 24 hours; and 3) A requirement to report any complaints and their resolution to EFSEC during monthly reports to the Council.

Light Mitigation

EFSEC has identified the following additional mitigation measure for the Project to avoid and/or minimize potential impacts from light:

LIG-1[32]: The Project would be constructed with LEED-certified building exterior(s) and security lighting to minimize vertical and horizontal illuminance to keep the lighting on site and to reduce impacts at the Lease Boundary and beyond.

[31] SF-: Identifier of numbered mitigation item for Shadow Flicker

[32] LIG-: Identifier of numbered mitigation item for Light

Glare Mitigation

There are no recommended mitigation measures proposed for glare.

4.10.2.5 Significant Unavoidable Adverse Impacts

Determining the significance of an impact involves context and intensity, which, in turn depend on the magnitude and duration of an impact. “Significant” in the Washington State Environmental Policy Act means a reasonable likelihood of more than a moderate adverse impact on environmental quality. An impact may also be significant if its chance of occurrence is not great, but the resulting environmental impact would be severe if it occurred (WAC 197-11-794).

This Draft EIS weighs the impacts on visual resources that may result from the Proposed Action with mitigation and makes a resulting determination of significance for each impact in **Tables 4.10-14a, 4.10-14b, and 4.10-14c**.

This Page Intentionally Left Blank

Table 4.10-14a: Summary of Potential Impacts on Visual Aspects, Light, and Glare during Construction of the Proposed Action

Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Visual Aspect	Turbine Option 1 Turbine Option 2	Activities would attract attention and would modify the localized existing landscape setting.	Medium	Short Term	Probable	Local	No mitigation identified	None identified
Visual Aspect	Solar Arrays BESSs Substations Transmission Lines	Activities would be seen and would attract attention in partially intact settings but would mostly be subordinate to existing landscape features.	Low	Short Term	Probable	Local	No mitigation identified	None identified
Visual Aspect	**Comprehensive Project**	Activities would attract attention and would modify the existing landscape setting. Due to the additive effect of the different Project features, these impacts would affect a larger area.	Medium	Short Term	Probable	Regional	No mitigation identified	None identified
Light	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations Transmission Lines **Comprehensive Project**	Activities would be completed mainly during daytime hours without the need for nighttime lighting.	Negligible	Temporary	Unlikely	Limited	No mitigation identified	None identified
Glare	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations Transmission Lines **Comprehensive Project**	Activities could generate glare from construction equipment or solar panels.	Low	Temporary	Feasible	Confined	No mitigation identified	None identified

Notes:
(a) The impacts related to each component, including “comprehensive Project,” were rated separately; components were combined in the same cell if they received the same impact ratings for the identified topic.
(b) Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.
(c) Mitigation measures listed here are additional actions that EFSEC could impose to further reduce the impacts. See Section 4.1 Introduction for details.
(d) Significant unavoidable impacts are those that would remain even after all identified additional mitigation measures have been required by EFSEC.
BESS = battery energy storage system; EFSEC = Washington Energy Site Evaluation Council

Table 4.10-14b: Summary of Potential Impacts on Visual Aspects, Shadow Flicker, Light, and Glare during Operation of the Proposed Action

Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Visual Aspect	Turbine Option 1 Turbine Option 2 **Comprehensive Project**	The proposed wind turbines, and comprehensive Project, would dominate views from many KOP locations, and the landscape would appear strongly altered.	High	Long Term	Unavoidable	Regional	**VIS-1**: Relocate turbines located within the foreground distance **VIS-2**: No advertising, cell antennas, commercial messages, or symbols placed on wind turbines **VIS-3**: Maintain clean nacelles and towers	Significant for Visual Aspects.
Visual Aspect	Solar Arrays Substations Transmission Lines	The proposed solar arrays (all options), substations, and transmission lines would attract attention and would modify the existing landscape setting.	Medium	Long Term	Unavoidable	Regional	**VIS-4**: Use color-treated solar collectors and support structures **VIS-5:** Avoid complete removal of vegetation beneath solar arrays **VIS-6:** Install color-treated, opaque fencing to screen views of the solar arrays **VIS-9**: Choose the type of transmission structure to best match the adjacent transmission lines	None identified
Visual Aspect	County Well & Bofer Canyon Solar Arrays	The proposed solar arrays (County Well and Bofer Canyon siting areas) would dominate views from some KOP locations, and the landscape would appear strongly altered in localized areas where there are limited existing landscape modifications.	High	Long Term	Unavoidable	Local	**VIS-4**: Use color-treated solar collectors and support structures **VIS-5:** Avoid complete removal of vegetation beneath solar arrays **VIS-6:** Install color-treated, opaque fencing to screen views of the solar arrays	None identified
Visual Aspect	Transmission Lines	The proposed transmission lines would dominate views from KOP 13 and the landscape would appear strongly altered in this localized area where there are limited existing landscape modifications.	High	Long Term	Unavoidable	Local	**VIS-8**: Maximize the span length across highways and other linear viewing locations **VIS-9**: Choose the type of transmission structure to best match the adjacent transmission lines	None identified
Visual Aspect	BESSs	The BESSs would attract attention from some KOP locations and would modify the localized existing landscape setting.	Medium	Long Term	Unavoidable	Local	**VIS-7:** Design BESSs to blend with the adjacent agricultural character	None identified
Shadow Flicker	Turbine Option 1 Turbine Option 2 **Comprehensive Project**	Wind turbines would create shadow flicker that would impact Project participants.	Medium	Long Term	Probable	Confined	**SF 1:** The Applicant would attempt to avoid, minimize and mitigate shadow flicker at nearby residences **SF 2:** The Applicant would set up a complaint resolution procedure	None identified

Table 4.10-14b: Summary of Potential Impacts on Visual Aspects, Shadow Flicker, Light, and Glare during Operation of the Proposed Action

Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Light	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations Transmission Lines **Comprehensive Project**	Lighting for security purposes and to conform with FAA requirements would be visible outside the Lease Boundary but would have limited effect in terms of light trespass and sky glow degradation.	Low	Long Term	Unavoidable	Local	**LIG 1:** Use LEED-certified building exterior(s) and security lighting	None identified
Glare	Solar Arrays **Comprehensive Project**	Solar panels at all modeled receptors and vehicular routes are predicted to not experience glare as a result of Project operations; glare would not exceed FAA notice criteria, and a formal filing is not necessary.	Low	Long Term	Unavoidable	Confined	No mitigation identified	None identified

Notes:
(a) The impacts related to each component, including “comprehensive Project,” were rated separately; components were combined in the same cell if they received the same impact ratings for the identified topic.
(b) Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.
(c) Mitigation measures listed here are additional actions that EFSEC could impose to further reduce the impacts. See Section 4.1 Introduction for details.
(d) Significant unavoidable impacts are those that would remain even after all identified additional mitigation measures have been required by EFSEC.
BESS = battery energy storage system; EFSEC = Washington Energy Site Evaluation Council; FAA = Federal Aviation Administration; KOP = key observation point; LEED = Leadership in Energy and Environmental Design

Table 4.10-14c: Summary of Potential Impacts on Visual Aspects, Light, and Glare during Decommissioning of the Proposed Action

Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Visual Aspect	Turbine Option 1 Turbine Option 2	Activities would attract attention and would modify the localized existing landscape setting.	Medium	Short Term	Probable	Local	No mitigation identified	None identified
Visual Aspect	Solar Arrays BESSs Substations Transmission Lines	Activities would be seen and would attract attention in partially intact settings but would mostly be subordinate to existing landscape features.	Low	Short Term	Probable	Local	No mitigation identified	None identified
Visual Aspect	**Comprehensive Project**	Activities would attract attention and would modify the existing landscape setting. Due to the additive effect of the different Project features, these impacts would affect a larger area.	Medium	Temporary (brief access modifications) Short Term (seasonal restrictions)	Probable	Limited (small area) Regional (decreased productivity)	No mitigation identified	None identified
Light	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations Transmission Lines **Comprehensive Project**	Activities would be completed mainly during daytime hours without the need for nighttime lighting.	Negligible	Temporary	Unlikely	Limited	No mitigation identified	None identified
Glare	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations Transmission Lines **Comprehensive Project**	Activities could generate glare from construction equipment or solar panels.	Low	Temporary	Feasible	Confined	No mitigation identified	None identified

Notes:
(a) The impacts related to each component, including "comprehensive Project," were rated separately; components were combined in the same cell if they received the same impact ratings for the identified topic.
(b) Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.
(c) Mitigation measures listed here are additional actions that EFSEC could impose to further reduce the impacts. See Section 4.1 Introduction for details.
(d) Significant unavoidable impacts are those that would remain even after all identified additional mitigation measures have been required by EFSEC.
BESS = battery energy storage system; EFSEC = Washington Energy Site Evaluation Council

4.10.3 Impacts of No Action Alternative

Visual Aspects Impacts

Under the No Action Alternative, impacts related to visual resources from the construction, operation, and decommissioning of the Proposed Action would not occur. For the purpose of this analysis, it is assumed that no future development would occur within the Lease Boundary.

Shadow Flicker

Under the No Action Alternative, none of the sources of shadow flicker described above for operation of the Proposed Action would occur, and no alternative use would cause shadow flicker other than the operation of wind turbines.

Light

Under the No Action Alternative, none of the lighting sources described above for construction, operation, and decommissioning of the Proposed Action would occur. Current agricultural land uses could have direct impacts from heavy farm equipment operations similar to construction and decommissioning of the Proposed Action in magnitude, duration, spatial extent, and likelihood.

Glare

Under the No Action Alternative, none of the glare sources described above for construction, operation, and decommissioning of the Proposed Action would occur. Current agricultural land uses could have direct impacts from heavy farm equipment operations similar to construction and decommissioning of the Proposed Action in magnitude, duration, spatial extent, and likelihood.

This Page Intentionally Left Blank

4.11 Noise and Vibration

This section evaluates the impacts of the proposed Horse Heaven Wind Farm (Project, or Proposed Action) on the levels of noise and vibration within the Project vicinity. Section 3.11 presents the affected environment for noise and vibration. The study area for this assessment includes the noise sensitive receptor (NSR) locations on adjacent properties and areas of dense population near the City of Kennewick, Washington, and the larger Tri-Cities urban area along the Columbia River.

Under the Washington State Environmental Policy Act, this Draft Environmental Impact Statement weighs the likelihood of occurrence with the severity of an impact (Washington Administrative Code [WAC] 197-11-794) and considers several factors when determining the significance of identified potential impacts (WAC 197-11-330 and WAC 197-11-794). These impacts were qualitatively assessed based on the method of analysis described in Section 4.1. The impact rating system is summarized in **Table 4.11-1**.

Table 4.11-1: Impact Rating Table for Noise and Vibration from Section 4.1

Factor	Rating →			
Magnitude	**Negligible** indistinguishable from the background	**Low** small impact, non-sensitive receptor(s)	**Medium** intermediate impact, may occur on sensitive receptor(s) or affect public health and safety	**High** large impact on sensitive receptor(s) or affecting public health and safety
Duration	**Temporary** infrequently during any stage	**Short Term** duration of construction or site restoration	**Long Term** during operation or operation plus another stage of Project	**Constant** during life of Project and/or beyond the Project
Likelihood	**Unlikely** not expected to occur	**Feasible** may occur	**Probable** expected to occur	**Unavoidable** inevitable
Spatial Extent/Setting	**Limited** small area of Lease Boundary or beyond Lease Boundary if duration is temporary	**Confined** within Lease Boundary	**Local** beyond Lease Boundary to neighboring receptors	**Regional** beyond neighboring receptors

As identified in **Table 4.11-2**, the determination of impact magnitude is based on impacts relating to noise and vibration. The identified ratings have been included to further define magnitude in each case.

Table 4.11-2: Criteria for Assessing Magnitude of Impacts on Noise and Vibration

Magnitude of Impacts	Description
Negligible	**Noise:** Not audible, and no increase in ambient noise levels. The noise environment would appear unaltered by Project components and would not attract attention. **Vibration:** No noticeable vibrations resulting from Project components would be measured, observed, or perceived at neighboring receptors. **State noise limits:** Project impacts would be below state limits at all NSR locations.
Low	**Noise:** Potentially audible, with an increase in noise level between 0 and 5 dBA. An increase in noise levels near the threshold of human perception (3 dBA). Would cause no interference to outdoor or indoor environments. **Vibration:** Vibrations resulting from Project components could be measured or observed at neighboring receptors. **State noise limits:** Project impacts would be below state limits at all NSR locations.
Medium	**Noise:** Audible, with an increase in noise level between 5 and 10 dBA. An observable increase in noise levels above the threshold of human perception. Noise level may interfere with outdoor or indoor environments. **Vibration:** Vibrations from Project components could be measured or observed at neighboring receptor's dwellings or structures. **State noise limits:** Project impacts would be at or below state limits at all NSR locations.
High	**Noise:** Audible, with an increase in noise level greater than 10 dBA. An increase of 10 dBA would be considered a doubling of the perceived noise level. Noise level would likely cause interference with outdoor and indoor environments. **Vibration:** Vibrations from Project components could be measured or observed at neighboring receptors at levels causing annoyance and/or the potential to cause structural damage to buildings or other structures. **State noise limits:** Project impacts would exceed state limits at NSR locations.

dBA = A-weighted decibels; NSR = noise sensitive receptor

Background

Potential impacts from the Proposed Action are assessed for noise during the construction, operation, and decommissioning stages of the following Project components:

- Turbine Option 1 and Turbine Option 2
- Solar Arrays
- Substations
- Battery Energy Storage Systems (BESSs)
- Comprehensive Project

The evaluation presented herein relies on the noise modeling and calculations of construction and operation presented in the Application for Site Certification (ASC) (Horse Heaven Wind Farm, LLC 2021a). For the assessment of noise impacts from Project development, this analysis includes a review of the following:

- Construction calculations presented in the ASC

- Construction noise calculations and operation noise modeling prepared by Horse Heaven Wind Farm, LLC (Applicant) (Horse Heaven Wind Farm, LLC 2021b, 2021c, 2021d)
- Supplemental emission calculations of noise impacts presented in this section

4.11.1 Method of Analysis

Anticipated noise impacts during construction and operation of the Project were quantified using sound attenuation over distance using hemispherical spreading for construction and an environmental sound propagation program (model) for operation. Hemispherical spreading describes the decrease in level when a sound wave propagates away from a source uniformly in all directions above ground. Noise impacts during construction were assumed to be representative of potential noise impacts during decommissioning. Vibration impacts were qualified using standard screening distances from construction equipment operation for both the construction and the decommissioning stages.

Construction Methodology

Construction of the Project is expected to be typical of other similar projects in terms of the schedule, equipment used, and construction activities such as land clearing, concrete work, and building. Construction activities would occur primarily during daytime hours within a typical construction work week (Monday through Saturday). Equipment would include cranes, land-clearing equipment, and earth-moving equipment. The noise level would vary during the construction period, depending on the construction stage. For this analysis, it was conservatively assumed that all potential construction equipment would be operating continuously at the closest location to an NSR. To calculate the changes in noise level in this scenario, the noise levels from all construction equipment were totaled and then the inverse square law was utilized. The inverse square law is a property in physics whereby an energy such as sound pressure (noise) varies with the distance from the source inversely as the square of the distance. Using this law, the noise level decreases by 6 A-weighted decibels (dBA) for each doubling of distance from the sound point source.

Ground-borne vibration generated by construction equipment typically diminishes rapidly with distance from the vibration source. Federal Transit Administration (FTA) screening distances from construction activities of 100 feet for highly vibration-sensitive buildings (e.g., hospitals with vibration-sensitive equipment) and 50 feet for residential uses and historic buildings were used to determine vibration impacts (FTA 2018).

Operation Methodology

Operation of the Project is expected to be typical of other similar projects. Noise models of the proposed turbine options were developed by Tetra Tech for the ASC and revised in a technical memo; the most impactful scenarios are addressed in this section (Horse Heaven Wind Farm, LLC 2021a, 2021d).

Noise impacts resulting from the Project were evaluated using the most recent version of CadnaA (Computer Aided Noise Abatement; DataKustik GmbH 2020), an environmental noise propagation computer program that was developed to assist with noise propagation calculations for major noise sources and projects. For this analysis, the major noise outdoor sources modeled are associated with Turbine Option 1 and Turbine Option 2. The major noise sources were wind turbines, solar arrays, substations, and BESSs. The sources were modeled using an expected operational usage factor of 100 percent. Usage factor accounts for the fraction of time that the equipment is in use over the specified time period. This is a conservative assumption as there are different operational cycles whereby some equipment will be operating while other equipment will be shut down and represents the maximum noise level that can be generated by the operational scenarios. **Appendix 4.11-1** describes the model inputs and lists the configuration of the calculation parameters used to complete noise modeling for the Project.

Wind Turbines

Sound generated by an operating turbine comprises both aerodynamic and mechanical sound, with the dominant sound component from modern utility-scale turbines being largely aerodynamic. Aerodynamic sound refers to the sound produced from air flow and the interaction with the turbine tower structure and moving rotor blades. Mechanical sound is generated by the gearbox, generator, and cooling fan and is radiated from the surfaces of the nacelle and machinery enclosure and by openings in the nacelle casing. Recent improvements in the design of turbine mechanical components and the use of improved noise-dampening materials have minimized mechanical noise emissions. Sound reduction elements in turbine design include impact noise insulation of the gearbox and generator, sound-reduced gearbox, sound-reduced nacelle, and rotor blades designed to minimize noise generation.

Wind energy facilities, in comparison to other energy-related facilities, are unique in that the sound generated by each individual turbine will increase as the wind speed across the site increases. Turbine sound is negligible when the rotor is at rest, increases as the rotor tip speed increases, and is generally constant once rated power output and maximum rotational speed are achieved. Under this condition, the maximum sound power level for turbines under the Project's Turbine Option 1 and Turbine Option 2 would be reached at approximately 15.7 to 22.4 miles per hour (7 to 10 meters per second), according to the manufacturer specifications (Horse Heaven Wind Farm, LLC 2021b). It is important to recognize that, as wind speeds increase, the background ambient sound level will generally increase as well, resulting in acoustic masking effects; however, this trend is also affected by local contributing sound sources. Therefore, during periods of elevated wind speed when higher turbine sound emissions occur, the sound produced from a turbine operating at maximum rotational speed may be somewhat masked due to wind-generated sound. In practical terms, this means that as turbine noise increases with increased rotational speed, so does the baseline noise environment in the area of the turbine. The ambient noise survey conducted for the Project confirms that, in general, the baseline noise levels in the study area increase as wind speeds increase (see Section 3.11, Table 3.11-4; Tetra Tech 2021; Horse Heaven Wind Farm, LLC 2022). Conversely, these acoustic masking effects may be limited during periods of unusually high wind shear (i.e., change in wind direction or speed) or at receiver locations that are sheltered from the prevailing wind direction.

The maximum number of turbines and maximum turbine height carried forward for analysis as components of the Project under Turbine Option 1 and Turbine Option 2 are summarized in **Table 4.11-3**. For the purposes of this study, the loudest turbine model was used for each of the turbine options.

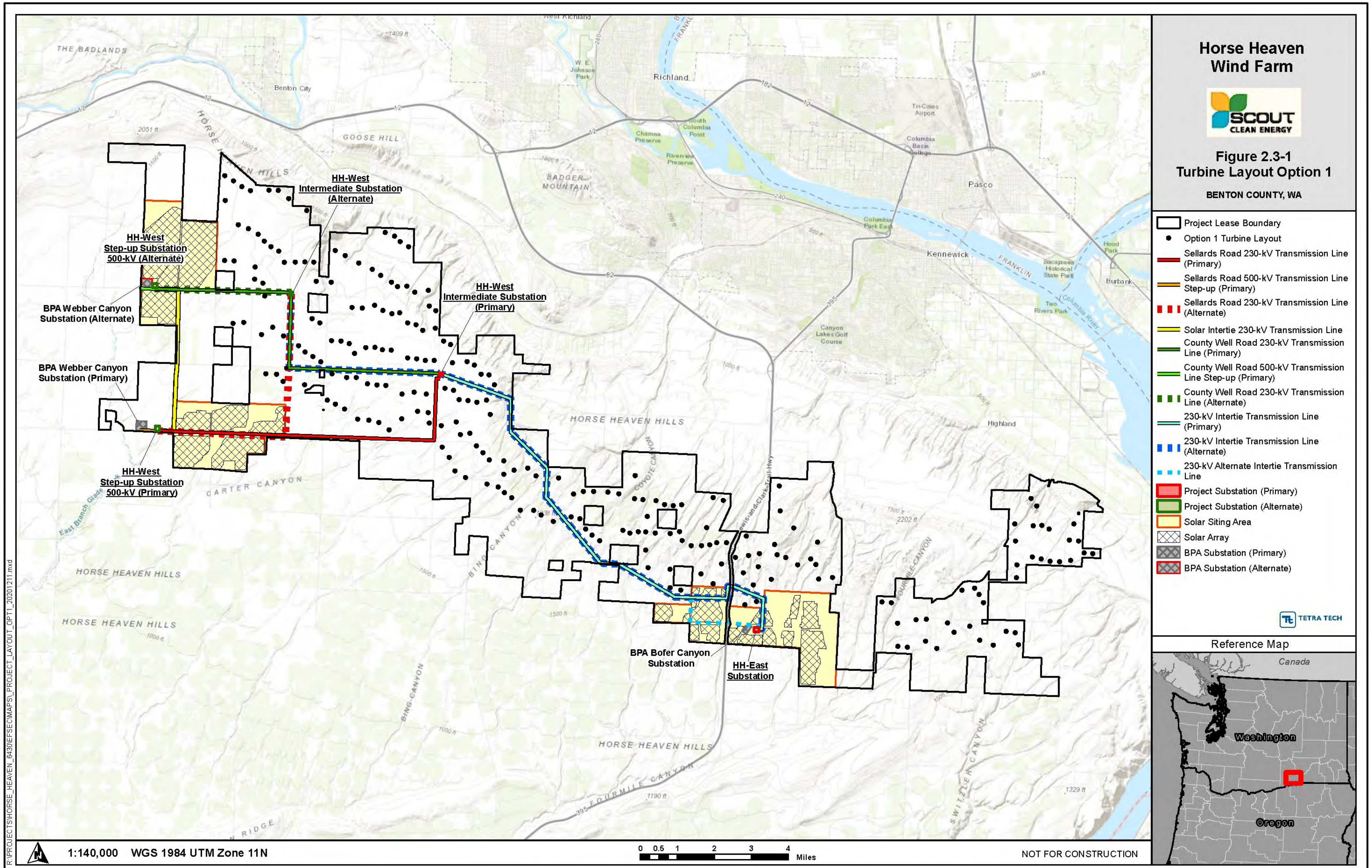
Table 4.11-3: Proposed Action Wind Turbine Layout and Model Options

Turbine Parameters/Features	Turbine Option 1	Turbine Option 2
Wind Turbine Output	GE 2.82-MW	GE 5.5-MW
Wind Turbine Layout	244 turbines up to a maximum blade tip height of 499 feet[(a)]	150 turbines up to a maximum blade tip height of 671 feet[(a)]
Tower Type	Tubular	Tubular
Turbine Rotor Diameter	417 feet	518 feet
Turbine Hub Height (ground to nacelle)	292 feet	411 feet
Tower Base Diameter	15.1 feet	15.1 feet
Maximum Rated Sound Power Level (dBA)[(b)]	110.0	107.5
Confidence Interval (k-factor)[(c)]	2 dBA	2 dBA

Source: Horse Heaven Wind Farm, LLC 2021a
Notes:
(a) As proposed in the ASC, Table 2.3-1
(b) As presented in the ASC, Table 4.1.1-7
(c) As presented in the ASC, Section 4.1.1.2
ASC = Application for Site Certification; dBA = A-weighted decibels; GE = General Electric; MW = megawatts

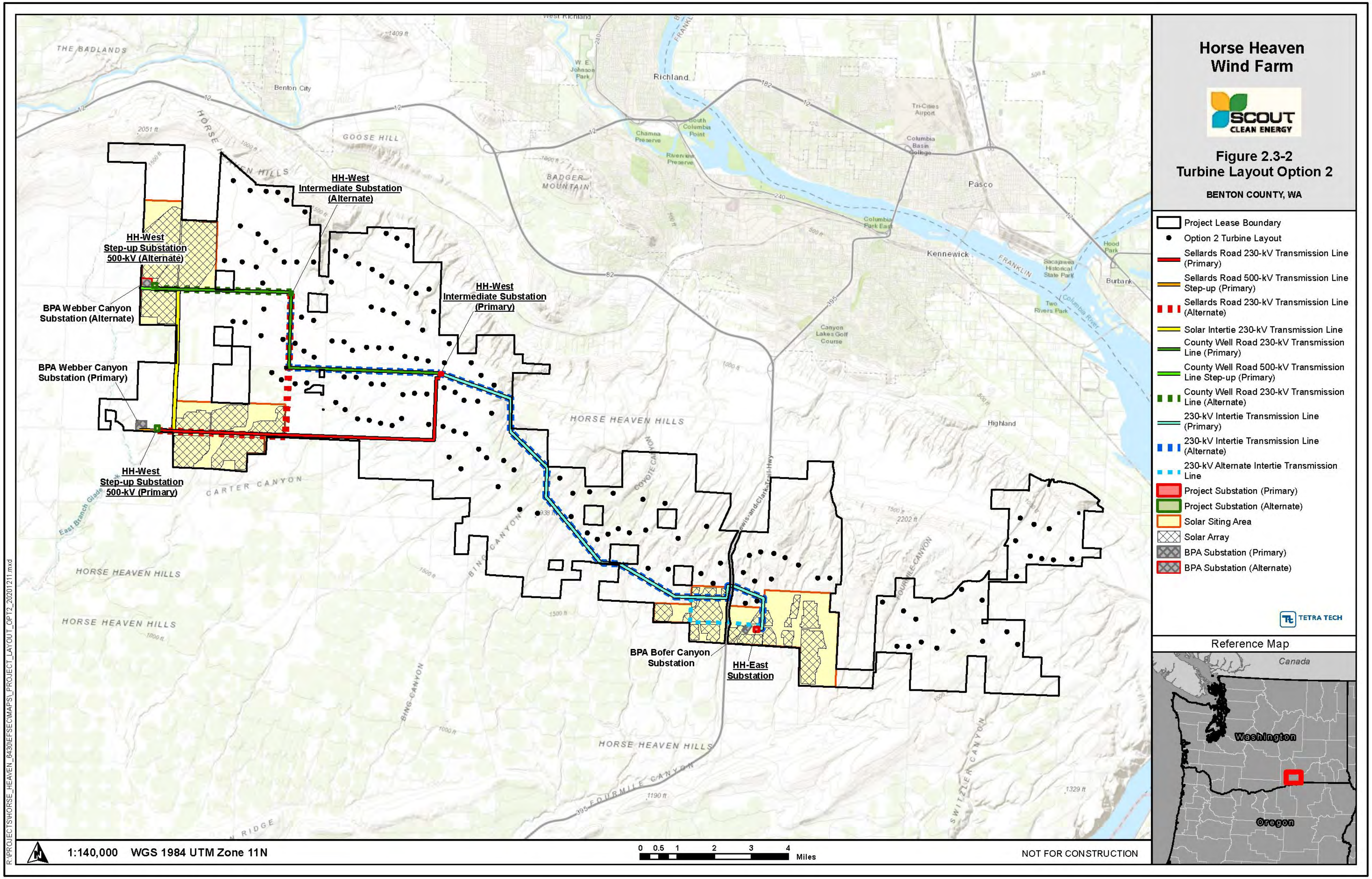
Turbine Option 1 is shown in **Figure 4.11-1**, and Turbine Option 2 is shown in **Figure 4.11-2**. The final number of turbines and the specific model used would depend on availability and other considerations at the time of construction. However, the number of turbines would not exceed 244, and the maximum turbine height (ground to blade tip) would not exceed 671 feet. The ASC noise assessment was based on two potential layout options with two potential turbine models per layout option.

This Page Intentionally Left Blank



Source: Horse Heaven Wind Farm, LLC 2021a

Figure 4.11-1: Turbine Option 1 Layout



Source: Horse Heaven Wind Farm, LLC 2021a

Figure 4.11-2: Turbine Option 2 Layout

Solar Arrays

The major components of the proposed solar energy generation systems are the solar modules, tracking systems, posts, and related electrical equipment (e.g., inverters and transformers). Inverters serve the function of converting direct current to alternating current in accordance with electrical regulatory requirements. The alternating current electricity from the inverters would be routed to transformers that would increase the output voltage from the inverter (660 volts per individual unit) to the collection system voltage (34.5 kilovolts [kV]). The transformers may be co-located with the inverters or may be centrally located within the solar array. Transformers at these locations would step up the voltage from the inverters. Sound emissions would be associated with the transformers and inverters. Electronic noise from inverters can be audible but is often reduced by a combination of shielding, noise cancelation, filtering, and noise suppression.

The Project's general arrangement was reviewed and directly imported into the acoustic model so that on-site equipment could be easily identified, buildings and structures could be added, and sound emission data could be assigned to sources as appropriate. The primary noise sources during operation of the solar arrays are the inverters and transformers.

Reference sound power levels input to CadnaA were provided by equipment manufacturers, based on information contained in reference documents or developed using empirical methods. The source levels used in the predictive modeling are based on estimated sound power levels that are generally deemed to be conservative. The projected operational noise levels are based on Applicant-supplied sound power level data for the major sources of equipment. **Table 4.11-4** summarizes the equipment sound power level data used as inputs to the initial modeling analysis.

Table 4.11-4: Modeled Octave Band Sound Power Level (dB) for Solar Equipment

Equipment	Sound Power Level for Octave Band Frequency (Hz)									Broadband (dBA)
	31.5	63	125	250	500	1,000	2,000	4,000	8,000	
Inverter/Transformer Block[(a)]	75	83	90	91	90	87	82	75	68	96

Source: Horse Heaven Wind Farm, LLC 2021c
Note:
(a) Revised sound power input levels table, November 2021
dB = decibels; dBA = A-weighted decibels; Hz = hertz

Battery Energy Storage Systems

Three BESSs may be developed for the Project. The BESSs would be capable of storing, and later deploying, up to 150 megawatts (MW) of energy each generated by the Project using lithium-ion batteries. Each BESS would use a series of self-contained systems. For the impact analysis, the BESSs were assumed to be placed adjacent to the three substations.

It is expected that all equipment associated with the BESSs could operate 24 hours per day. Reference sound power levels input to CadnaA were provided by equipment manufacturers, based on information contained in reference documents or developed using empirical methods. The source levels used in the predictive modeling are based on estimated sound power levels that are generally deemed to be conservative, as they are based on louder measurements or assumptions that would generate a higher sound level. The projected operational BESS noise levels are associated with storage container cooling equipment and are based on Applicant-supplied sound power level data for the major sources of equipment (Horse Heaven Wind Farm, LLC 2021a). **Table 4.11-5** summarizes the equipment sound power level data used as inputs to the initial modeling analysis.

Table 4.11-5: Modeled Octave Band Sound Power Level for Battery Energy Storage System

Equipment	Octave Band Sound Power Level (dB) by Frequency (Hz)									Broadband (dBA)
	31.5	63	125	250	500	1,000	2,000	4,000	8,000	
Single BESS Unit[(a)]	54	64	71	77	80	79	78	73	64	85
Total BESS (50 Units)	71	81	88	94	97	96	95	90	81	102

Source: Horse Heaven Wind Farm, LLC 2021a
Note:
(a) BESS sound power is given per container. The modeling assumed 50 containers per storage area.
BESS = battery energy storage system; dB = decibels; dBA = A-weighted decibels; Hz = hertz

Substations

The primary ongoing noise sources at substations are the transformers, which generate sound generally described as a low humming. There are three main sound sources associated with a transformer: core noise, load noise, and noise generated by the operation of the cooling equipment. The core vibrational noise is the principal noise source and does not vary significantly with electrical load.

Transformer noise varies with transformer dimensions, voltage rating, and design and attenuates with distance. The noise produced by substation transformers is primarily caused by the load current in the transformer's conducting coils (or windings), and, consequently, the main frequency of this sound is twice the supply frequency (60 hertz [Hz]). The characteristic humming sound of transformers consists of tonal components generated at harmonics of 120 Hz. Most of the acoustical energy resides in the fundamental tone (120 Hz) and the first three or four harmonics (240, 360, 480, and 600 Hz).

Circuit-breaker operation may also cause audible noise, particularly the operation of air-blast breakers, which is characterized as an impulsive sound event of very short duration and expected to occur no more than a few times throughout the year. Because of its short duration and infrequent occurrence, circuit-breaker noise was not considered in this analysis.

The Project would include up to five on-site locations where substations could be sited to support the wind and solar facilities, which were incorporated into the acoustic modeling analysis. Substation transformer broadband sound source levels were derived based on their given specifications and/or transformers used at similar facilities. Transformer sound source data by octave band center frequency were calculated based on the estimated transformer National Electrical Manufacturers Association rating using standardized engineering guidelines (NEMA 2019). **Table 4.11-6** lists the five substations, the number of transformers planned for installation at each substation, and the transformer megavolt ampere ratings. Sound source level details cannot be disclosed because that information is considered proprietary to the transformer manufacturers.

Table 4.11-6: Modeled Octave Band Sound Power Level for Substation Transformers

Substation	Trans-former MVA Rating	Number of Trans-formers	Octave Band Sound Power Level (dB) by Frequency (Hz)									Broad-band (dBA)
			31.5	63	125	250	500	1,000	2,000	4,000	8,000	
HH-East Substation	120	1	58	78	90	92	98	95	91	86	77	101
	250	1	71	91	103	105	111	108	104	99	90	113
	192	1	66	86	98	100	106	103	99	94	85	109
	137	1	64	84	96	98	104	101	97	92	83	107
HH-West (34.5 to 230 kV; 250 MW Wind)	120	1	58	78	90	92	98	95	91	86	77	101
	147	1	64	84	96	98	104	101	97	92	83	107
HH-West (34.5 to 230 kV; 250 MW Solar)	120	1	58	78	90	92	98	95	91	86	77	101
	192	1	66	86	98	100	106	103	99	94	85	109
HH-West (230 to 500 kV) - Sellards Road	187	4 (max 3 running at once)	66	86	98	100	106	103	99	94	85	109
HH-West (230 to 500 kV) - County Well Road	187	4 (max 3 running at once)	66	86	98	100	106	103	99	94	85	109

Source: Horse Heaven Wind Farm, LLC 2021c
dB = decibels; dBA = A-weighted decibels; Hz = hertz; kV = kilovolts; max = maximum; MVA = megavolt amperes; MW = megawatts

Transmission Lines

One of the electrical effects of high-voltage transmission lines is corona. Corona is the ionization of the air that occurs at the surface of the energized conductor and suspension hardware attributable to very high electric field strength at the surface of the metal during certain conditions. Corona may result in radio and television reception interference, audible noise, light, and the production of ozone. Corona noise is generally a principal concern with transmission lines of 345 kV and greater during foul weather. Corona noise is also generally associated with foul weather conditions. Because the Project design voltage is 230 kV, no corona-related noise issues are anticipated, and any related impacts would be negligible and temporary during foul weather events.

4.11.2 Impacts of Proposed Action

4.11.2.1 Impacts during Construction

Noise

During construction, noise would be generated with the use of heavy machinery and equipment operations. **Table 4.11-7** summarizes equipment that may be used for the Project and estimates of construction sound levels at a reference distance of 50 feet and a far-field distance of 2,500 feet. Construction activities for Turbine Option 1 and Option 2, solar arrays, substations, and the BESSs are assumed to use similar noise-generating equipment. Therefore, one estimated sound level source was calculated for all construction scenarios based on the concurrent operation of the equipment. Potential impacts from construction are presented as the comprehensive Project in Table **4.11-10a**.

The estimated composite site noise level assumes that all equipment would operate simultaneously at the given usage factor, over a standard 8-hour workday, to calculate the composite average daytime sound level. This assumption is conservative since locations and operating times of construction equipment could be different. Additionally, pile-driver operations are only expected to be needed during the construction of solar arrays and are the loudest individual piece of equipment and were included in the composite average daytime sound level.

Table 4.11-7: Estimated Lmax Sound Pressure Levels from Construction Equipment

Equipment	Lmax Equipment Sound Level At 50 feet (dBA)[a]	Usage Factor (%)[b]	Equipment Sound Level At 50 feet (dBA)	Equipment Sound Level at Closest NSR (dBA)[c]	Equipment Sound Level at 2,500 feet (dBA)
Crane	85	16	77	40	34
Forklift	80	40	76	39	33
Backhoe	80	40	76	39	33
Grader	85	40	81	44	38
Man Basket	85	20	78	41	35
Dozer	88	40	84	47	41
Loader	88	40	84	47	41
Scissor Lift	85	20	78	41	35
Truck	85	40	81	44	38
Welder	73	40	69	32	26
Compressor	80	40	76	39	33
Concrete	77	50	74	37	31
Pile Driver [d]	95	20	86	49	43
Composite				55	49

Source: Horse Heaven Wind Farm, LLC 2021a
Notes:
(a) Data compiled in part from the following sources: Bolt Beranek and Newman, Inc. 1977; FHWA 2006.
(b) The usage factor is percentage of time during operation that a piece of construction equipment is operating at full power.
(c) Closest NSR within the Lease Boundary, NSR 214 at 1,259 feet.
(d) Pile drivers are expected to be associated with solar array construction only.
dBA = A-weighted decibels; Lmax = maximum sound pressure level; NSR = noise sensitive receptor

In addition to the equipment listed in **Table 4.11-7**, generators may be used for temporary power over the approximately 19-week turbine commissioning period. Commissioning mainly includes the testing and startup of the wind turbines after they are installed, but before they begin normal operations. The generators would be relocated throughout the site as needed to facilitate turbine commissioning. The generators would be housed in a sound-attenuated container, which is specified at a maximum of 75 dBA at 50 feet. Sound emissions resulting from the generators would be low level, especially when compared to other construction equipment on site, and are not expected to add to the noise levels in the area.

Outdoor conversations may be subject to mild interference when ambient noise levels are above 55 dBA; levels above 65 dBA are considered significant interference to conversations held outdoors (EPA 1974). The estimated composite noise level of 55 dBA, shown in **Table 4.11-7,** does not exceed this guideline as a daily average noise impact. Given that there could be a noise level higher than 55 dBA at times, the construction of the Project may cause short-term, but unavoidable, noise impacts that temporarily interfere with speech communication outdoors and indoors with windows open when construction is in the area. Based on the specific location, noise levels at receptors up to 2,500 feet (49 dBA) could experience an increase to baseline noise levels up to 10 dBA for periods of time. This is expected to be limited as daytime baseline noise levels on average ranged from 37 dBA to 44 dBA and the distance attenuation calculations are conservative as they omit ground and other attenuation factors. Noise levels resulting from the construction activities could vary considerably, depending on the operations being performed and the overall condition of the equipment.

Project construction would generally occur during the day, Monday through Saturday. Furthermore, all reasonable efforts would be made to minimize the impact of noise resulting from construction activities, including implementation of standard noise reduction measures. Noise impacts from construction would be limited to the time period when construction of the closest turbine(s) to the affected NSR location(s) and would not occur throughout the entire construction stage. Due to the infrequent nature of loud construction activities at the site, the limited hours of construction, and the implementation of noise mitigation measures, the temporary increase in noise due to construction would be limited.

Blasting

Depending on subsurface conditions, blasting may be necessary to loosen rock before excavation (Horse Heaven Wind Farm, LLC 2021a). Blasting is a short-duration event compared to other rock removal methods such as track rig drills, rock breakers, jack hammers, rotary percussion drills, core barrels, and/or rotary rock drills. Blasting creates a sudden and intense airborne noise potential, as well as local ground vibration. Modern blasting techniques include electronically controlled ignition of multiple small explosive charges in an area of rock. The detonations are timed so that the energy from one detonation destructively interferes with others, which is called wave canceling. Impulse (instantaneous) noise from blasts could reach up to 140 dBA at the blast location, attenuating to approximately 90 dBA at a distance of 500 feet from the blast (Horse Heaven Wind Farm, LLC 2021b). This instantaneous noise is typically less than 1 second in duration and, as such, has little impact on the overall time-weighted average at an NSR. Additionally, at 1,000 feet, the sound level would attenuate to 84 dBA. This instantaneous noise level is below typical worker health-related exposure levels for an 8-hour workday of 85 dBA; therefore, no negative health impacts would be expected from blasting. Based on this understanding, noise from this source would result in low, temporary, feasible, and limited impacts from blasting.

Vibration

Ground vibration could occur during large equipment operations and pile driving, drilling, and blasting. Vibration would be limited to normal construction hours (during the daytime), be of short duration, and occur in the direct area under construction. With the closest residence being over 1,000 feet from expected construction locations, no highly vibration-sensitive buildings or residences are located within the FTA's furthest screening distance of 100 feet for construction equipment operations.

Impact Rating

The results presented in **Table 4.11-7** and in this section are discussed in the context of the impact rating system:

- **Magnitude –** Construction noise impacts at the closest NSR locations would be medium as the noise could be loud enough at times to temporarily interfere with speech communication outdoors and indoors with windows open and could increase noise levels between 5 dBA and 10 dBA above baseline. Vibration impacts would be low and would not impact off-site receptors.
- **Duration –** The impacts of construction noise and vibration would be temporary and would only occur during construction in the immediate vicinity of an NSR, not throughout the entire period of the construction stage. As construction activities move from location to location within the Lease Boundary, noise and vibration sources would move with them. NSR locations not near the areas of construction would experience few to no impacts from distant construction equipment or activities.
- **Likelihood –** Noise impacts would be probable during the construction stage. Vibration impacts would be feasible during the construction stage during blasting and pile driving activities.
- **Spatial Extent –** The spatial extent of noise and vibration would be limited to the area currently under construction. Noise and vibration may be perceived beyond the Lease Boundary, but the impacts would be temporary.

Activities during construction of all components of the Project would result in medium, temporary, probable, and limited impacts from noise and vibration.

4.11.2.2 Impacts during Operation

This section describes the model used for the assessment of noise during Project operation, input assumptions used to calculate noise levels due to the Project's normal operation, and the results of the noise impact analysis (Horse Heaven Wind Farm, LLC 2021a, 2021d). Since the equipment listed above is anticipated to operate simultaneously, two modeling scenarios were considered: one with Turbine Option 1 operating with the solar arrays, substations, and BESSs and the second with Turbine Option 2 operating with the solar arrays, substations, and BESSs. Potential impacts from operations are presented as the comprehensive Project in **Table 4.11-10b**.

Combined Noise Impacts of Components

Turbine Option 1

The modeling results in **Table 4.11-8** are presented based on receptor locations (NSR ID) and their participation status in regard to the Project (i.e., residents with whom the Applicant has a lease agreement are termed "Project participants"). The participation status identifications are as follows:

- Participant – NSR locations that are Project participants
- Outside Project – NSR locations that are not Project participants
- In Pursuit – NSR locations that are being pursued as Project participants

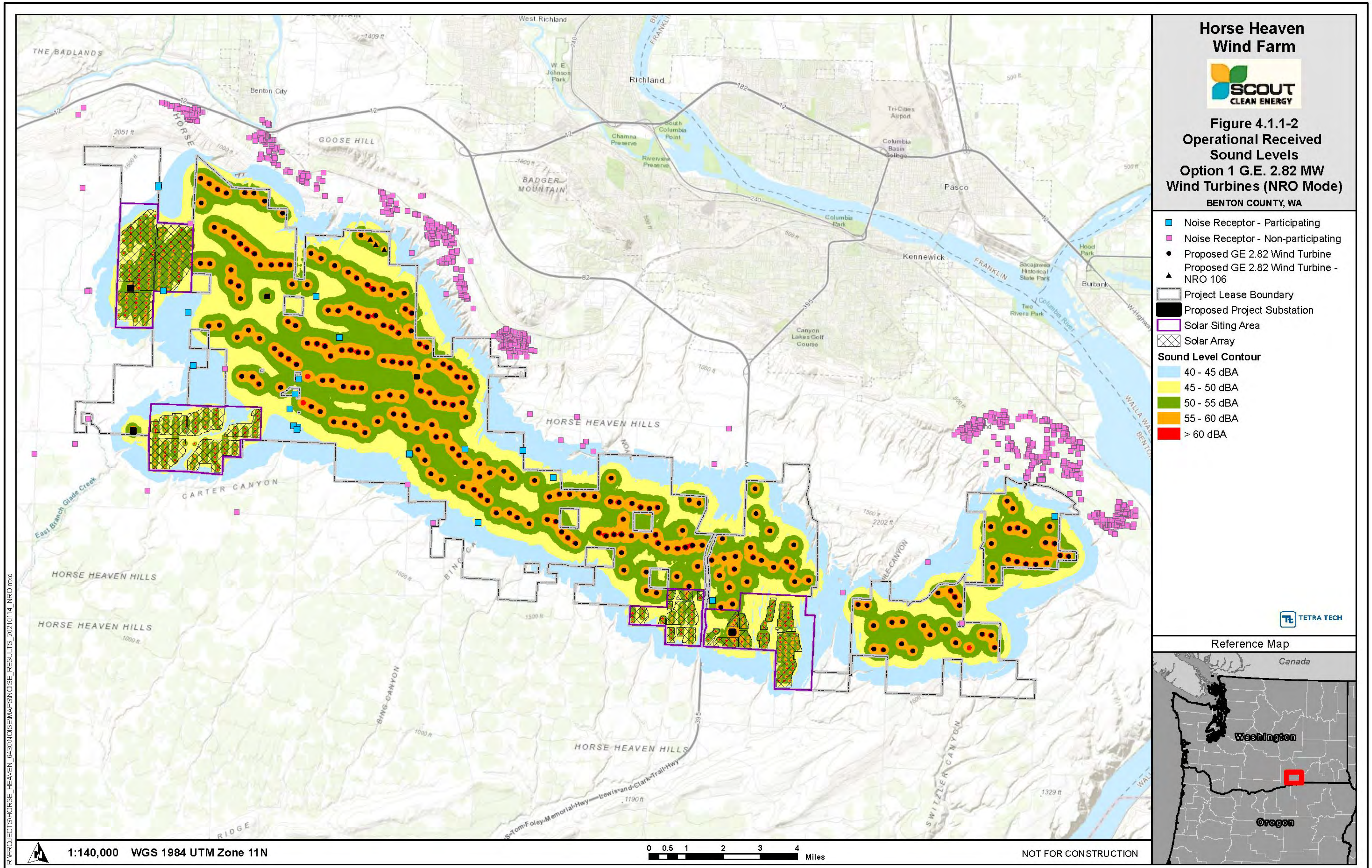
These results presented in **Figure 4.11-3** show that noise propagation is mainly affected by distance, with limited effects from changes in terrain. The major areas of noise are the individual turbine locations and the substations. The maximum modeled noise level at the 21 participating NSR locations was 54 dBA at NSR 214. The maximum modeled noise level at 720 non-participating NSR locations was 48 dBA, at NSR 34 and NSR 178. The maximum modeled noise level at the one NSR with an in-pursuit status was 49 dBA at NSR 211. The maximum modeled noise level at the Lease Boundary was 63 dBA (Horse Heaven Wind Farm, LLC 2021d). At these NSR locations, Turbine Option 1 increased baseline noise levels between 3 dBA and 21 dBA.

Table 4.11-8: Maximum Modeled Operational Noise Levels at Residential Receptors and Boundary

NSR ID	Participation Status[a]	EDNA and Noise Limit (dBA)	Option 1, Modeled (dBA)	Baseline (dBA)[b]	Option 1, Predicted (dBA)[c]
214[d]	Participant	Class C / 70	54	33	54
34[d]	Outside Project	Class A / 50	48	45	48
178[d]	Outside Project	Class A / 50	48	46	50
211[d]	In Pursuit	Class A / 50	49	37	49
Boundary[e]	Outside Project	Class C / 70	63	38	63

Source: Horse Heaven Wind Farm, LLC 2021d
Notes:
[a] As of November 2021.
[b] Most representative baseline level to the NSR.
[c] Predicted noise level calculated by logarithmically adding the modeled and baseline noise levels together
[d] Revised modeling results from November 2021.
[e] Modeled noise levels provided in Horse Heaven Wind Farm, LLC's response to Data Request No. 3, July 2021 (Horse Heaven Wind Farm, LLC 2021b)
dBA = A-weighted decibels; EDNA = Environmental Designation for Noise Abatement; NSR = noise sensitive receptor

This Page Intentionally Left Blank



Source: Horse Heaven Wind Farm, LLC 2021d

Figure 4.11-3: Operational Received Sound Levels Option 1 G.E. 2.82 MW Wind Turbines (Noise-Reduced Operation Mode)

Turbine Option 2

The modeling results show that noise propagation is mainly affected by distance, with limited effects from changes in terrain. The major areas of noise are the individual turbine locations and the substations. The maximum modeled noise level at the 21 participating NSR locations was 48 dBA at NSR 214. The maximum modeled noise level at 720 non-participating NSR locations was 42 dBA at NSR 178. The maximum modeled noise level at the one NSR with an "in pursuit" status was 39 dBA at NSR 211. The maximum modeled noise level at the Lease Boundary was 54 dBA. At these NSR locations, Turbine Option 2 increased baseline noise levels between 2 dBA and 15 dBA. Modeling results are summarized in **Table 4.11-9** and illustrated in **Figure 4.11-4**.

Table 4.11-9: Maximum Modeled Operational Noise Levels at Residential Receptors and Boundary

NSR ID(s)	Participation Status[(a)]	EDNA and Noise Limit (dBA)	Option 2, Modeled (dBA)	Baseline (dBA)[(b)]	Option 2, Predicted (dBA)[(c)]
214[(d)]	Participant	Class C / 70	48	33	48
178[(d)]	Outside Project	Class A / 50	42	38	48
211[(d)]	In Pursuit	Class A / 50	39	37	41
Boundary[(e)]	Outside Project	Class C / 70	54	38	54

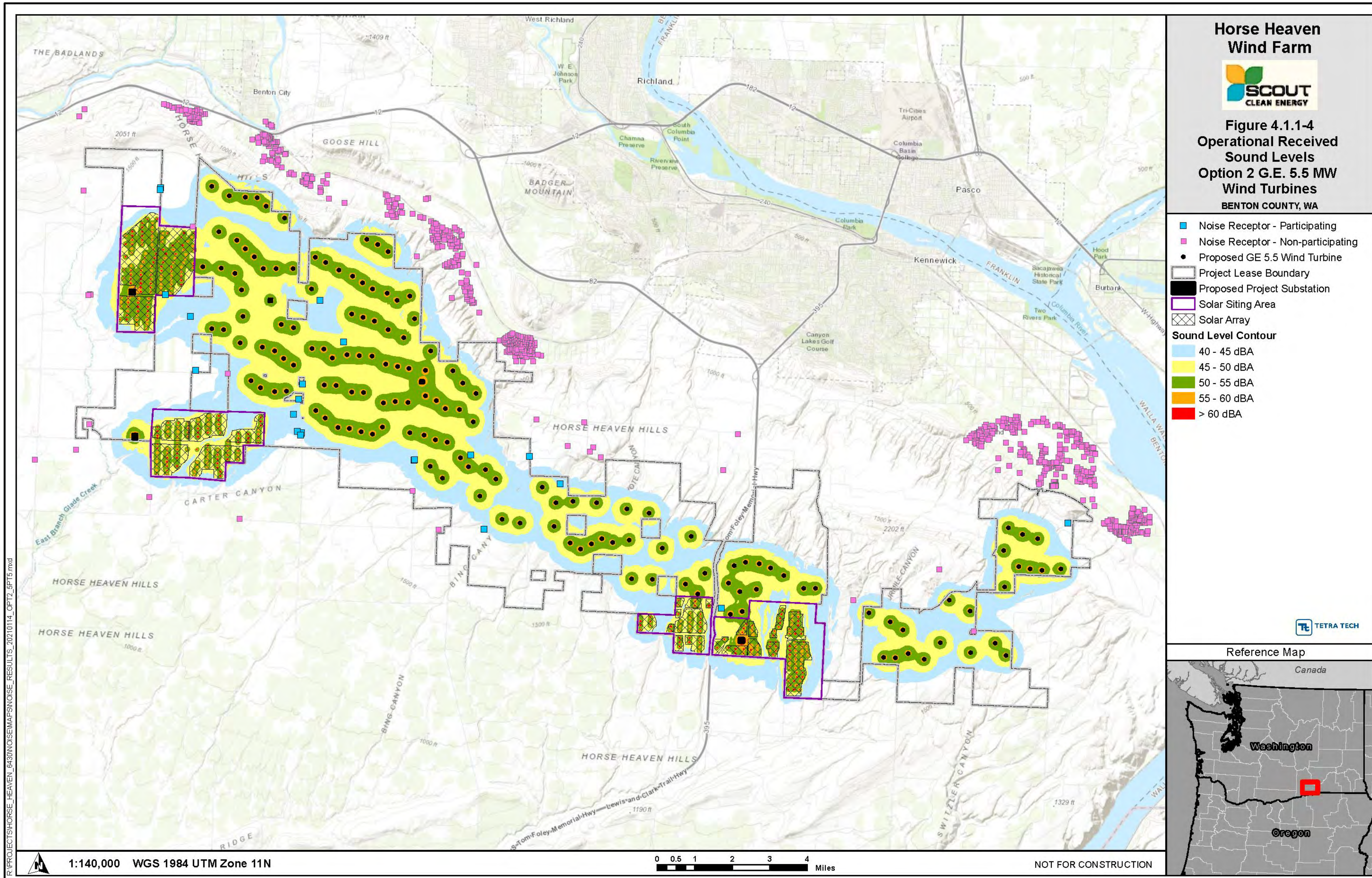
Source: Horse Heaven Wind Farm, LLC 2021a
Notes:
(a) As of November 2021.
(b) Most representative nighttime baseline noise level measurement to the NSR.
(c) Predicted noise level calculated by logarithmically adding the modeled and baseline noise levels together.
(d) Horse Heaven Wind Farm ASC, Appendix O (Horse Heaven Wind Farm, LLC 2021a).
(e) Modeled noise levels provided in Horse Heaven Wind Farm, LLC's response to Data Request No. 3, July 2021 (Horse Heaven Wind Farm, LLC 2021b).
dBA = A-weighted decibels; EDNA = Environmental Designation for Noise Abatement; NSR = noise sensitive receptor

Turbine Option Summary

Maximum predicted results outlined in the tables above were evaluated against applicable WAC regulatory requirements, both at NSRs and at the Lease Boundary. For NSRs located on land with a Class A Environmental Designation for Noise Abatement (EDNA) (land zoned RL-5) and for non-participating NSRs located on Class C EDNA land (land zoned Growth Management Act Agricultural District), compliance was conservatively assessed relative to the WAC 173-60.040 50 dBA nighttime limit. The compliance status of participating NSRs located on Class C EDNA land was evaluated against the applicable daytime and nighttime 70-dBA limit for Class C lands. At the Lease Boundary, where the Project is adjacent to Class A EDNA land, compliance was assessed relative to the 50 dBA nighttime limit. At the Lease Boundary, where the Project is adjacent to Class C EDNA land, compliance was assessed relative to the 70-dBA limit.

The maximum noise impacts occurred under the Turbine Option 1 turbine layout modeled, with compliance achieved at all NSRs and at the property boundary based on the applicable WAC 173-60 regulatory limits described previously. While not all boundary locations were below the Class A noise limit, all locations with received sound levels greater than 50 dBA are classified as Class C land, where the applicable daytime and nighttime sound limit is 70 dBA.

This Page Intentionally Left Blank



Source: Horse Heaven Wind Farm, LLC 2021a

Figure 4.11-4: Operational Received Sound Levels Option 2 G.E. 5.5 MW Wind Turbines

Vibration

Ground vibrations are not expected to occur during Project operation under either turbine option or as a result of any Project components.

Impact Rating

The results presented above are discussed in the context of the impact rating system:

- **Magnitude** – Noise levels at the closest NSR locations would be medium as the noise impacts could be at or near the WAC nighttime noise limit of 50 dBA, would not interfere with outdoor or indoor activities, but would increase noise levels more than 10 dBA at NSR locations with low baseline noise levels.
- **Duration –** The duration of noise impacts would be long term for the entirety of Project operation.
- **Likelihood –** The noise impacts would be unavoidable during operation.
- **Spatial Extent –** The special extent would be local and confined to NSR locations in close proximity to wind turbines.

Noise impacts from operation are expected to be moderate at NSR locations in close proximity to wind turbines. Turbine Option 1 is predicted to generate greater noise levels than Turbine Option 2, but under both options, the predicted noise levels would be less than the applicable noise limit. Activities during operation of all components of the Project would result in medium, long term, unavoidable and local impacts from noise and vibration.

4.11.2.3 Impacts during Decommissioning

Noise

Due to the limited information available regarding decommissioning activities, noise impacts during this period are not specifically calculated. The primary sources of noise during decommissioning are expected to be heavy equipment operations similar in scope to those used during construction, but during decommissioning this noise would have a shorter duration at each location. Furthermore, no pile drivers or blasting are expected to be needed during decommissioning. However, it is reasonable to assume that jackhammers or similar equipment may be needed to break up concrete. It is therefore expected that noise impacts would be less than or similar to those calculated for construction, and these impacts can be used as a conservative estimate. Potential impacts from construction are presented as the comprehensive Project in **Table 4.11-10c**.

Vibration

Ground vibration could occur during large equipment operations during decommissioning. Vibration would be limited to normal construction hours (during the daytime), would be of short duration, and would occur in the area directly under the place of use. No drilling, pile driving, or blasting is expected to occur during this stage; therefore, vibration caused by decommissioning is expected to be less than vibration caused by construction. With the closest residence being over 1,000 feet from expected construction locations, no highly vibration-sensitive buildings or residences were located within the FTA's furthest screening distance of 100 feet for construction equipment operations.

Impact Rating

The results presented in Section 4.11.2.1 are discussed in the context of the adopted impact rating system below:

- **Magnitude** – Noise levels at the closest NSR locations would be medium as the noise impacts could be loud enough at times to temporarily interfere with speech communication outdoors and indoors with windows open and could increase noise levels between 5 dBA and 10 dBA above baseline. Vibration impacts are not expected.
- **Duration –** The duration of decommissioning noise and vibration impacts would be temporary and occur only when decommissioning is occurring in the immediate area of a sensitive receptor and not during the entire period of this stage.
- **Likelihood –** Noise impacts would be probable during the decommissioning stage. Vibration impacts are unlikely to occur during the construction stage.
- **Spatial Extent –** The spatial extent for noise and vibration would be limited to the area currently under construction. Noise may be perceived beyond the Lease Boundary, but the impacts would be temporary.

Activities during decommissioning of all components of the Project would result in medium, temporary, probable, and limited impacts from noise and vibration.

4.11.2.4 Applicant Commitments and Identified Mitigation

This section describes measures that would reduce or compensate for impacts related to noise from construction, operation, and decommissioning of the Project. These measures would be implemented in addition to compliance with the environmental permits, plans, and authorizations required for the Proposed Action.

Applicant Commitments

The Applicant has identified measures and/or best practices that are designed to prevent or minimize potential impacts on the affected environment for the Project. Measures presented by the Applicant in the ASC (Horse Heaven Wind Farm, LLC 2021a) and taken into consideration in the characterization of potential impacts on noise and vibration are discussed in Section 2.3 and summarized below.

Construction and Decommissioning

Because construction equipment operates intermittently and the types of machines that would be used at the Project site would change with the stage of construction, noise emitted during construction would be mobile and highly variable, making it challenging to control. The construction management protocols would include the following best management practices and noise mitigation measures to minimize noise impacts:

- Maintain all construction tools and equipment in good operating order according to manufacturers' specifications.
- Limit use of major excavating and earth-moving machinery to daytime hours.
- To the extent practicable, schedule construction activity during normal working hours on weekdays when higher sound levels are typically present and are found acceptable. Some limited activities, such as concrete pours, will be required to occur continuously until completion.
- Equip any internal combustion engine used for any purpose on the job or related to the job with a properly operating muffler that is free from rust, holes, and leaks.

- For construction devices that utilize internal combustion engines, ensure that the engine's housing doors are kept closed, and install noise-insulating material mounted on the engine housing consistent with manufacturers' guidelines, if possible.
- Limit possible evening shift work to low-noise activities such as welding, wire pulling, and other similar activities, together with appropriate material handling equipment.
- Utilize a complaint resolution procedure to address any noise complaints received from residents.

Operation

Modeling results indicated that under Turbine Option 2, Project operation would be in compliance with the WAC 173-60 regulatory requirements at NSRs and the Lease Boundary; therefore, no noise mitigation measures are needed for operation under Turbine Option 2. The following mitigation measures are proposed for operation under Turbine Option 1.

- Manufacturer-provided options for noise mitigation, including the use of low noise trailing edge (LNTE) technology and noise reduced operation (NRO) modes. LNTE consists of the addition of plastic or metal sawtooth serrations that can be affixed to the blade's rear edge to reduce blade trailing edge noise. Application of NRO modes limits the rotational speed of the turbines to reduce their sound emissions. For the Turbine Option 1 layout using General Electric (GE) 2.82-MW turbines, to demonstrate compliance with the applicable WAC regulatory limits at the Lease Boundary adjacent to Class A lands, select turbines would need to operate in NRO mode. Several NRO modes are available for the GE 2.82-MW turbine, depending on the turbine hub height. Those NRO modes and their corresponding sound source level characteristics were evaluated, and several modeling iterations were conducted to determine what level of NRO would be required to successfully demonstrate Project compliance.
- Modeling iterations for the Option 1 layout using the GE 2.82-MW turbine indicated that Turbine IDs 6, 7, and 8 would need to operate in NRO 106 mode to comply with the applicable 50 dBA nighttime limit at the Lease Boundary adjacent to Class A EDNA land with a source sound power level of 106 dBA in NRO mode, as reported by the turbine manufacturer.
- Modeling iterations for the Turbine Option 1 layout using the GE 3.03-MW turbine found that Turbine IDs 6, 7, and 8 would need to be equipped with LNTE technology to comply with the applicable 50-dBA nighttime limit at the Lease Boundary adjacent to Class A EDNA lands. The maximum rated sound power level for the GE 3.03-MW turbine equipped with LNTE will be 106 dBA, as reported by the turbine manufacturer.

Recommended Mitigation Measures

The Washington Energy Facility Site Evaluation Council (EFSEC) has identified additional mitigation measures for the Project to avoid impacts on noise and vibration.

Construction and Decommissioning

The following measures are recommended for mitigation of noise resulting from Project construction and decommissioning:

N-1[33]: Avoid laydown and equipment storage/parking areas closer than 2,500 feet from the nearest NSR location. These laydown and storage areas will have more noise sources for longer periods of time than other areas; therefore, setting these locations further from NSR locations will limit the sound level and the duration that such equipment can impact an NSR.

N-2: Limit large, noise-generating equipment operations, such as earth-moving equipment, cranes, and trucks, as outlined in **Table 4.11-7**, to daytime hours (between 7 a.m. and 10 p.m.), and limit the loudest and most impulsive pieces of construction equipment and activities, such as pile-driver operations and blasting, to typical working hours only: 7 a.m. to 6 p.m., Monday through Saturday. This measure would ensure that a typical workday would not include pile-driver operations or blasting during the evening hours (6 p.m. to 10 p.m.) but could include some on-site activities during nighttime hours such as early morning setup and preparation for the workday. Nighttime operations would be atypical. The purpose is to limit noise impacts during sensitive hours while allowing contractors some flexibility.

N-3: Monitor noise during nighttime operations (between 10 p.m. and 7 a.m.), when operations have the potential to impact NSRs to ensure that operations do not exceed state noise limits.

N-4: Update the Applicant's noise complaint resolution procedure to better address and respond to noise complaints. These updates should include the following: 1) Set up a 24-hour "noise hot line" or other form of communication that the public can use to report any undesirable noise conditions associated with the construction of the Project, with the ability to log the date and time of a complaint. This line of communication would be maintained through the end of construction; 2) Make an attempt to contact the complainant within 24 hours; 3) Require that any complaints and their resolution be reported to EFSEC during monthly reports to the Council.

Operation

Additional recommendations for noise mitigation operational noise includes the following:

N-5: Establish a noise complaint resolution procedure similar to that proposed for construction and decommissioning to better address and respond to noise complaints.

N-6: Maintain operation of the "noise hot line" (or similar) until the Project has been operational for at least one year at which time this can be reassessed to continue or be terminated.

4.11.2.5 Significant Unavoidable Adverse Impacts

Determining the significance of an impact involves context and intensity, which, in turn, depend on the magnitude and duration of an impact. "Significant" in the Washington State Environmental Policy Act means a reasonable likelihood of more than a moderate adverse impact on environmental quality. An impact may also be significant if its chance of occurrence is not great, but the resulting environmental impact would be severe if it occurred (WAC 197-11-794).

---

[33] N-: Identifier of numbered mitigation item for Noise

This Draft Environmental Impact Statement weighs the potential impacts from noise that may result from the Proposed Action with mitigation and makes a resulting determination of significance for each impact in **Tables 4.11-10a, 4.11-10b, and 4.11-10c**.

This Page Intentionally Left Blank

Table 4.11-10a: Summary of Potential Impacts on Noise and Vibration during Construction of the Proposed Action

Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Noise and Vibration – Construction Equipment	**Comprehensive Project**	Most noise sensitive receptors would receive sound levels below 55 dBA during construction, with the potential to be up to 10 dBA over baseline. One noise sensitive receptor could receive sound levels at 55 dBA during construction of one turbine.	Medium	Temporary	Probable	Limited	**N1:** Avoid laydown and equipment storage/parking areas near NSRs **N2:** Limit the use of noise-generating equipment to daytime hours (7 a.m. to 10 p.m.) and loud equipment to working hours (7 a.m. to 6 p.m.) **N-3:** Monitor noise during nighttime operations (10 p.m. to 7 a.m.) with the potential to impact NSRs **N-4:** Set up a 24-hour "noise hot line" or similar and update the Applicant's noise complaint resolution procedure to include contacting and reporting details	None identified
Noise and Vibration – Blasting	**Comprehensive Project**	Sound levels can reach up to 140 dBA at blast locations and 90 dBA at 500 feet.	Low	Temporary	Feasible	Limited	**N2:** Limit blasting to working hours (7 a.m. to 6 p.m.)	None identified

Notes:
(a) The impacts related to each component, including "comprehensive Project" were rated separately; components were combined in the same cell if they received the same impact ratings for the identified topic.
(b) Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.
(c) Mitigation measures listed here are additional actions that EFSEC can identify to further reduce the impacts. See Section 4.1 Introduction for details.
(d) Significant unavoidable impacts are those that remain even after all mitigation measures identified by EFSEC have been applied.
dBA = A-weighted decibels; EFSEC = Washington Energy Facility Siting Evaluation Council; NSR = Noise Sensitive Receptor

Table 4.11-10b: Summary of Potential Impacts on Noise and Vibration during Operation of the Proposed Action

Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Noise and Vibration – Operational Noise	**Comprehensive Project**	Noise would be generated by the operation of wind turbines, inverters, transformers, and the corona effect.	Medium	Long Term	Unavoidable	Local	**N-5:** Establish a noise complaint resolution procedure similar construction **N-6:** Maintain operation of the "noise hot line" for one year of Project operation	None identified

Notes:
[a] The impacts related to each component, including "comprehensive Project," were rated separately; components were combined in the same cell if they received the same impact ratings for the identified topic.
[b] Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.
[c] Mitigation measures listed here are additional actions that EFSEC can identify to further reduce the impacts. See Section 4.1 Introduction for details.
[d] Significant unavoidable impacts are those that remain even after all mitigation measures identified by EFSEC have been applied.
EFSEC = Washington Energy Facility Siting Evaluation Council; NSR = Noise Sensitive Receptor

Table 4.11-10c: Summary of Potential Impacts on Noise and Vibration during Decommissioning of the Proposed Action

Topic	Component[a]	Description of Impact[b]	Magnitude of Impact ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Noise and Vibration – Decommissioning Equipment	**Comprehensive Project**	Most noise sensitive receptors would receive sound levels below 55 dBA during construction, with the potential to be up to 10 dBA over baseline. One noise sensitive receptor could receive sound levels at 55 dBA during construction of one turbine.	Medium	Temporary	Probable	Limited	**N1:** Avoid laydown and equipment storage/parking areas near NSRs **N2:** Limit the use of noise-generating equipment to daytime hours (7 a.m. to 10 p.m.) and loud equipment to working hours (7 a.m. to 6 p.m.) **N-3:** Monitor noise during nighttime operations (10 p.m. to 7 a.m.) with the potential to impact NSRs **N-4:** Set up a 24-hour "noise hot line" or similar and update the Applicant's noise complaint resolution procedure to include contacting and reporting details	None identified

Notes:
(a) The impacts related to each component, including, "comprehensive Project" were rated separately; components were combined in the same cell if they received the same impact ratings for the identified topic.
(b) Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.
(c) Mitigation measures listed here are additional actions that EFSEC can identify to further reduce the impacts. See Section 4.1 Introduction for details.
(d) Significant unavoidable impacts are those that remain even after all mitigation measures identified by EFSEC have been applied.
dBA = A-weighted decibels; EFSEC = Washington Energy Facility Siting Evaluation Council; NSR = Noise Sensitive Receptor

4.11.3 Impacts of No Action Alternative

Under the No Action Alternative, impacts related to noise and vibration from the construction, operation, and decommissioning of the Project would not occur. For the purpose of this analysis, it is assumed that no future development would occur within the Lease Boundary.

This Page Intentionally Left Blank

4.12 Recreation

This section describes impacts on recreational uses and areas that could occur in the study area as a result of the construction, operation, and decommissioning of the proposed Horse Heaven Wind Farm (Project, or Proposed Action) proposed by Horse Heaven Wind Farm, LLC (Applicant), or under the No Action Alternative. Section 3.12 presents the affected environment for recreation. Safety of recreation enthusiasts is discussed in this section and Section 4.13 Public Health and Safety presents additional analysis of safety within the Project vicinity and Lease Boundary.

Under the Washington State Environmental Policy Act, this Draft Environmental Impact Statement weighs the likelihood of occurrence with the severity of an impact (Washington Administrative Code [WAC] 197-11-794) and considers several factors when determining the significance of identified potential impacts (WAC 197-11-330 and WAC 197-11-794). These impacts were qualitatively assessed based on the method of analysis described in Section 4.12.1. The impact rating system is summarized in **Table 4.12-1**.

Table 4.12-1: Impact Rating Table for Recreation from Section 4.1

Factor	Rating →			
Magnitude	**Negligible** indistinguishable from the background	**Low** small impact, non-sensitive receptor(s)	**Medium** intermediate impact, may occur on sensitive receptor(s) or affect public health and safety	**High** large impact on sensitive receptor(s) or affecting public health and safety
Duration	**Temporary** infrequently during any stage	**Short Term** duration of construction or site restoration	**Long Term** during operation or operation plus another stage of Project	**Constant** during life of Project and/or beyond the Project
Likelihood	**Unlikely** not expected to occur	**Feasible** may occur	**Probable** expected to occur	**Unavoidable** inevitable
Spatial Extent/Setting	**Limited** small area of Lease Boundary or beyond Lease Boundary if duration is temporary	**Confined** within Lease Boundary	**Local** beyond Lease Boundary to neighboring receptors	**Regional** beyond neighboring receptors

As identified in **Table 4.12-2**, the determination of impact magnitude is based on the continued ability of an individual to use a recreational facility, the impact on the quality of the recreational experience, and the potential for the impact to be a public health and safety concern.

Table 4.12-2: Criteria for Assessing Magnitude of Impacts on Recreation Resources

Magnitude of Impacts	Description
Negligible	**Use:** Use of recreational areas would remain unchanged. **Recreational Experience:** Quality of recreational experience for users or their satisfaction with the recreational resource remains unchanged. **Public Health and Safety:** No potential of an incident to occur affecting public health and safety.
Low	**Use:** Recreational activities could be measurably altered, but impacts would not change the ability of recreationists to use the area or perform the activity. **Recreational Experience:** Quality of recreational experience for users may change. Some values that recreationists may deem as important to their individual experience may become altered. **Public Health and Safety:** No potential of an incident to occur affecting public health and safety.
Medium	**Use:** Recreational activities could be considerably altered. Recreationists may experience slight crowding or concern with the Project affecting the ability of previous recreational use. **Recreational Experience:** Quality of recreational experience for users would change measurably. Most values that a recreationist deems as important to their individual experience would become altered. **Public Health and Safety:** A single public health and safety incident could occur.
High	**Use:** Recreational activities could be severely altered or unable to use the resource altogether. **Recreational Experience:** Quality of recreational experience for users would change considerably. All values that a recreationist deems as important to their individual experience may become altered. **Public Health and Safety:** Multiple incidents affecting public health and safety or a fatality could occur.

Background

For some recreationists, undeveloped lands, scenery, and the quiet of nature are important aspects of the recreational experience. Recreational users' sensitivity to visual quality and landscape character varies depending on their reasons for visiting an area. Impacts associated with the Project that may affect the visual setting, noise, and access to recreational sites are noted in this section and evaluated in greater detail in other sections, as follows:

- Impacts related to visual setting (including light and glare) are addressed in Section 4.10.
- Impacts related to noise and vibration are addressed in Section 4.11.
- Impacts related to traffic are addressed in Section 4.14.

4.12.1 Method of Analysis

The study area for recreation consists of the Lease Boundary and a 25-mile area surrounding the Lease Boundary, as defined in the Application for Site Certification (ASC) (Horse Heaven Wind Farm, LLC 2021a). Laws and regulations used to determine the Project's potential impacts on recreation are summarized in **Table 4.12-3**. Information reviewed to identify the potential impacts on recreational uses and areas in the study area was obtained from federal agencies, state agencies, local planning documents, and public scoping. Impacts on recreation within the study area were qualitatively assessed based on the impact evaluation approach defined in Section 4.1.

Table 4.12-3: Laws and Regulations for Recreation

Regulation, Statute, Guideline	Description
Local	
Shoreline Management Master Program Regulations as required by RCW 90.58.080	Carries out responsibilities imposed on the respective cities and counties within the Shoreline Management Act of 1971.
County Comprehensive Plans as required by RCW 36.70A.010	Identifies goals, objectives, and policies to protect and maintain resources and preserve land use while promoting development, local coordination, and education.
Washington State Comprehensive Outdoor Recreation Plan	Characterizes recreational use at statewide and regional analysis levels.
State	
Washington Growth Management Act; RCW 36.70A	Establishes a series of 13 goals that should act as the basis of all comprehensive plans, including RCW 36.70A.020(9), which guides the use of open space and recreation for the purpose of retaining open space, enhancing recreational opportunities, conserving fish and wildlife habitat, increasing access to natural resource lands and water, and developing parks and recreation facilities.
Washington State Recreation and Conservation Plan 2018–2022	Provides a strategic direction for how local, regional, state, and federal agencies, tribal governments, and private and nonprofit partners can work together to make sure Washington residents' outdoor recreation and conservation needs are met.
WAC 173-60-030	Establishes limits on sounds crossing property boundaries, based on EDNA. Includes Class A EDNA; where people reside and sleep, including residential and recreational areas (e.g., camps parks, camping facilities, and resorts).
Fish and Wildlife; WAC 220	Introduces the WDFW and describes regulations promoting conservation of fish and wildlife, while providing fishing, hunting, fish and wildlife viewing, and other outdoor recreation opportunities compatible with healthy, diverse, and sustainable fish and wildlife populations (RCW 77.04.012, 77.04.020, 77.04.055).
RCW 77.04.012	Identifies the responsibility of the WDFW to conserve the wildlife and food fish, game fish, and shellfish resources in a manner that does not impair the resource.

EDNA= Environmental Designation for Noise Abatement; RCW= Revised Code of Washington; WAC = Washington Administrative Code; WDFW = Washington Department of Fish and Wildlife

4.12.2 Impacts of Proposed Action

Recreation sites discussed in Section 3.12 may be affected by the Project. These sites offer recreational opportunities, including parks and places for camping, hiking, hunting on public lands, fishing, boating, swimming, wildlife viewing (including bird watching), and recreational sports (e.g., paragliding).

The study area includes the Ice Age Floods National Geologic Trail (IAF-NGT). However, the Project's Lease Boundary is outside of the physical Ice Age flood pathway as identified on the IAF-NGT, Washington Section Map (DNR 2016). The Project's components would not directly impact the prominent naturally vegetated steep slopes and elevated ridges that define the Columbia Basin landscape and are uniquely a product of the Ice Age floods (Horse Heaven Wind Farm, LLC 2021b). The 24 features within the study area are identified in Section 3.12, Table 3.12-4. The nearest IAF-NGT feature is Badger Coulee, approximately 0.84 miles north of the Project Lease Boundary. None of the IAF-NGT's features are within the Lease Boundary, and the IAF-NGT is not analyzed further. Visual setting is discussed in more detail in Section 4.10.

Up to 10 turbines,15.3 miles of collector cable, and a portion of the Sellards Solar Field may be located on lands that would be leased from the Washington Department of Natural Resources (DNR). The 10 turbines located on DNR-administered land would limit recreational activities to outside the footprint of each turbine. Passive recreational uses within the proposed transmission line corridor would be possible on DNR land where practical and are not addressed further.

The portion of the Sellards Solar Field that overlaps DNR-administered land would limit recreational activities to outside the solar field's fence. Currently, hunting on public lands, hiking, and bird watching may occur on these DNR-administered land, and impacts related to the construction, operation, and decommissioning of the Sellards Solar Field are analyzed in the following subsections.

Construction, operation, and decommissioning activities would take place a substantial distance from waterways or wetlands and are not likely to cause water quality impacts in the event of an accidental release. No in-water construction or access to the Project by water is proposed; therefore, the activities would not conflict with in-water recreation within the study area and are not analyzed further herein.

Impacts relating to the construction, operation and maintenance, and decommissioning of the components of the Project are discussed in more detail below.

4.12.2.1 Impacts during Construction

Construction activities could limit access to recreational facilities or conflict with recreational uses. Impacts related to the construction of the two turbine options and other components are described below. Impacts of the construction of the overall Project are described last.

Turbine Option 1

At peak construction periods, workers may seek accommodation in recreational vehicle (RV) parks or campgrounds. It is unknown what percentage of the workforce would be non-local during construction of the turbines, specifically. Of all the Project components, construction of the turbines is expected to require the largest number of workers. However, turbine construction would likely be phased by specialty (earthwork, concrete, construction of components, etc.), minimizing the quantity of total RV park or campground space required for housing at one time. Temporary accommodation in the study area includes RV parks and campsites. Facilities in Benton and Franklin Counties include 12 RV parks and campgrounds, with a total of 1,320 RV spaces (Horse Heaven Wind Farm, LLC 2021a). Benton County may experience small increases in costs of park use and recreation due to related temporary increases in population.

Visual impacts on recreation resources introduced during construction would vary depending on the specific recreational resource being considered. Depending on the location of a specific recreational resource, views of construction activities or turbines may be fully or partially obstructed or viewers may have more wide-open views. Impacts from light would be negligible, while impacts from glare would be low during the construction of the Project. Visual effects resulting from construction of the turbines, including light and glare, are addressed in more detail in Section 4.10.

Construction-related noise would be temporary and would be noticeable at recreation sites that are close to the Lease Boundary. Noise could affect the recreational experience of those engaged in hunting on public lands, fishing, or camping nearby. See Section 4.11 for a detailed analysis of noise generated by construction of the turbines.

Construction vehicles and the transportation of materials could cause temporary delays on local roads used to access recreational activities in the study area during the construction of turbines. Public roads would require intersection improvements, and access roads would have to be constructed. The magnitude of potential impacts related to each recreational site during the construction of turbines within the study area is summarized in **Table 4.12-4**. See Section 4.14 for a detailed analysis of traffic impacts and mitigation during construction.

Construction of turbines would introduce a risk to paragliders and hang gliders who use the 20 launch sites known within the study area. The main risks to these recreationists would be:

- Losing safe landing space in the event of an in-flight emergency requiring an unanticipated landing in an area containing turbines and supporting infrastructure.
- Collision with a turbine, supporting infrastructure, or construction equipment if a paraglider or hang glider loses the ability to steer mid-flight.

Construction activities under Turbine Option 1 would result in impacts on recreation resources as follows:

- **Recreation – Use:** Construction under Turbine Option 1 would limit recreational activities on public land in areas near construction and may impede cyclists' use of established routes during the transportation of equipment and materials, resulting in a local, medium, short term, unavoidable impact during construction.
- **Recreation – Recreational Experience:** Indirect impacts related to visual resources and noise produced by construction under Turbine Option 1 could occur at nearby recreation sites, resulting in a high, unavoidable, regional impact on recreational sites beyond neighboring receptors. Impacts would be long term once the turbines were constructed.
- **Recreation – Public Health and Safety:** Construction under Turbine Option 1 would have the potential to affect the health and safety of paragliders and hang gliders regionally, resulting in a medium, unavoidable, long term impact for the life of the Project.

Turbine Option 2

The impacts on recreation during the Project's construction stage under Turbine Option 2 would be similar to those described for Turbine Option 1, as follows:

- **Recreation – Use:** Construction under Turbine Option 2 would limit recreational activities on public land in areas near construction and may impede cyclists' use of established routes during the transportation of equipment and materials, resulting in a local, medium, short-term, unavoidable impact during construction.
- **Recreation – Recreational Experience:** Indirect impacts related to visual resources and noise produced by construction under Turbine Option 2 could occur at nearby recreation sites, resulting in a high, unavoidable, regional impact on recreational sites beyond neighboring receptors. Impacts would be long term once the turbines were constructed.

- **Recreation – Public Health and Safety:** Construction under Turbine Option 2 would have the potential to affect the health and safety of paragliders and hang gliders regionally, resulting in a medium, unavoidable, long term impact for the life of the Project.

Solar Arrays

The three proposed solar arrays would have common impacts on recreation during the Project's construction stage.

At peak construction periods, workers may seek accommodation in RV parks or campgrounds. It is unknown what percentage of the workforce would be non-local during construction of the solar arrays. Temporary accommodation in the study area would include RV parks and campsites. Facilities in Benton and Franklin Counties include 12 RV parks and campgrounds, with a total of 1,320 RV spaces (Horse Heaven Wind Farm, LLC 2021a). Benton County may experience small increases in costs of park use and recreation due to related temporary increases in population.

- Visual impacts on recreation resources would be limited due to the solar arrays' low profile. Construction activities and the presence of equipment and work crews during construction could be visible from nearby recreational sites. Impacts from light and glare would vary depending on the specific recreational resource being considered. Visual effects resulting from construction of the solar arrays are addressed in more detail in Section 4.10.
- Construction-related noise would be temporary and is not expected to be noticeable at most recreation sites. Noise could affect the recreational experience of those engaged in the use of multi-use trails, hunting on public lands, fishing, or camping nearby. See Section 4.11 for a detailed analysis of noise generated by construction of the solar arrays.
- Minor delays on local roads used to access recreational activities are expected during construction of the solar arrays due to the transportation of construction materials. See Section 4.14 for a detailed analysis of traffic impacts and mitigation during construction.
- The construction of the solar arrays would introduce a risk to paragliders and hang gliders. The main risk would be the loss of safe landing space in the event of an in-flight emergency requiring an unanticipated landing in an area containing solar arrays, supporting infrastructure, or construction equipment.
- Construction of the Sellards Solar Field would restrict access to an entire parcel of DNR-administered land and may remove land use that the parcel currently offers recreationists.

Construction of the solar arrays would result in impacts on recreation resources, as follows:

- **Recreation – Use:** The Project's potential to affect access to public land resulting from construction of the Sellards Solar Field would result in a limited, unavoidable, high, long term impact.
- **Recreation – Recreational Experience:** Indirect impacts related to visual resources and noise produced by construction of the solar arrays could occur, resulting in a regional, high, unavoidable impact on recreational sites beyond neighboring receptors. Impacts would be long term once the solar arrays were constructed.
- **Recreation – Public Health and Safety:** Construction of the solar arrays would have the potential to affect the health and safety of paragliders and hang gliders regionally, resulting in a medium, unavoidable, long term impact for the life of the Project.

Battery Energy Storage Systems

The three proposed battery energy storage systems (BESSs) would have common impacts on recreation during the Project's construction stage. Activities during the Project's construction stage for the BESSs would last approximately nine months and may impact recreational opportunities within the study area.

- Visual impacts on recreation resources would be negligible due to the BESSs' low profile and features in the area being taller than the BESSs. Impacts from light and glare would be negligible. Construction work would be concentrated during daylight hours, minimizing the potential need for temporary night-time lighting. Visual effects resulting from construction of the BESSs are addressed in more detail in Section 4.10.
- Impacts caused by construction-related noise would be temporary and are not expected to be noticeable at most recreation sites. See Section 4.11 for a detailed analysis of noise generated by the construction of the BESSs.
- Delays on local roads used to access recreational activities are not expected during construction of the BESSs due to the small number of large components and fewer trips required to transport construction materials. See Section 4.14 for a detailed analysis of traffic impacts and mitigation during construction.
- Construction of the BESSs is not expected to pose a risk to paragliders and hang gliders who use the 20 launch sites known within the study area. The proposed disturbance footprint for the BESSs is negligible compared to other components, and paragliders are expected to be able to easily avoid emergency landing within the construction area of the BESSs.

Construction activities for the BESSs would result in negligible, temporary, feasible, local impacts on recreation use, experience, and public health and safety.

Substations

The five proposed substations would have common impacts on recreation during the Project's construction stage. Activities during the construction of the substations would last less than six months and would have a negligible impact on recreational opportunities within the study area due to the smaller disturbance footprint and limited height compared to other Project components.

- Visual impacts on recreation resources would be limited during construction of the substations. Construction activities and the presence of equipment and work crews during construction could be visible from nearby recreational sites. Impacts from light and glare would vary depending on the specific recreational resource being considered. Visual effects resulting from construction of the substations are addressed in more detail in Section 4.10.
- Construction-related noise would be temporary and is not expected to be noticeable at recreation sites. See Section 4.11 for a detailed analysis of noise generated by the construction of the substations.
- Delays on local roads used to access recreational activities could occur during construction of the substations during the transportation of construction materials. See Section 4.14 for a detailed analysis of traffic impacts and mitigation during construction.
- Construction of the substations is not expected to impact existing recreational paragliding and hang gliding activity. The proposed disturbance footprint and construction area for the substations is negligible compared

to other components of the proposed Project, and paragliders and hang gliders are expected to be able to easily avoid landing within the fenced area of the substations.

- Compared to the construction of other infrastructure, the potential to affect the health and safety of recreationists using the area for paragliding and hang gliding is unlikely, and therefore results in a negligible impact. Construction activities are considered temporary due to the short time required during the construction period in comparison to the turbines and solar arrays. Impacts may occur to neighboring receptors.

Construction activities for the substations would result in negligible, temporary, feasible, local impacts on recreation use, experience, and public health and safety.

Comprehensive Project

Construction of the combined Project components would result in both direct and indirect impacts on recreationists who use the Project's study area for recreational activities.

Indirect impacts related to visual resources and noise could occur at recreation sites. Paragliders' and hang gliders' safety would be affected by the construction of the Project. Construction vehicles and the transportation of materials could cause temporary delays on local roads used to access recreational activities in the study area during construction. Public roads would require intersection improvements, and new access roads would have to be constructed.

RV parks and campgrounds may have increased occupancy during construction of the comprehensive Project. On-site construction activities are expected to employ an average of 300 workers during the Project's construction period, and non-local employment would average approximately 113 workers. Existing limits on the length of stay in public camping areas would minimize any potential impacts on park users. Benton County may experience small increases in costs for park use and recreation due to related temporary increases in population.

Activities during construction of all components of the Project would result in impacts on recreation, as follows:

- **Recreation – Use:** The comprehensive Project's potential to affect the use of public land near the Project and access to public land resulting from the construction of the Sellards Solar Field would result in a local, unavoidable, high, long term impact.
- **Recreation – Recreational Experience:** Indirect impacts related to visual resources and noise produced by the construction of the comprehensive Project could occur at nearby recreation sites, resulting in a high, unavoidable regional impact beyond neighboring receptors. The long term impact would occur throughout the life of the Project.
- **Recreation – Public Health and Safety:** The comprehensive Project's potential to affect the health and safety of paragliders and hang gliders would result in a regional, medium, unavoidable long term impact for the life of the Project.

4.12.2.2 Impacts during Operation

The Project's operation stage would result in direct and indirect adverse impacts on recreation resources. Impacts would be long term during the Project's operational life of up to 35 years (Horse Heaven Wind Farm, LLC 2021a).

Transportation-related impacts are not expected for existing recreational uses during operation of any of the Project components, due to the small operations team, and are therefore not analyzed for this stage. See Section 4.14 for a detailed analysis of traffic impacts and mitigation during operation.

Impacts related to the operation stage of the two turbine options and other components are described below. Impacts of the operation of the overall Project are described last.

Turbine Option 1

The Project's impacts on recreation in the study area during the operation stage under Turbine Option 1 would be measurable.

Long term visual impacts on recreation resources would be measurable during the operation stage of Turbine Option 1. Areas identified as having potential visibility of large numbers of the Project's proposed turbines include:

- The Horse Heaven Hills to the west and southwest of the Lease Boundary
- Areas on the southwest-facing slopes of the Rattlesnake uplift formation:
    - Red Mountains
    - Candy Mountains
    - Badger Mountains
- Areas ranging from approximately 8 to 10 miles to the north, northeast, and east of the Lease Boundary, including parts of the Tri-Cities urbanized area and agricultural areas beyond (SWCA 2022).

Recreational areas within or adjacent to the Lease Boundary with foreground views are likely to have more views of the turbines given their proximity to the Project's infrastructure. While an analysis could not be completed for all recreational sites due to a lack of key observation points, it is expected that there would be a high visual impact on the Badger Mountain Centennial Preserve, Chandler Butte, and the McBee Trailhead. A medium visual impact could be experienced by recreationists at the McNary National Wildlife Refuge. The turbine towers would be painted off-white with a non-reflective coating, and aviation lighting would be mounted on the turbine nacelles, in accordance with Federal Aviation Administration regulations. Impacts from light would be low, while impacts from glare would be negligible during the operation of the Project. The magnitude of potential impacts related to each recreational site during the operation of turbines within the study area is summarized in **Table 4.12-4**. Visual effects resulting from construction of the turbines, including light and glare, are addressed in more detail in Section 4.10.

Operational noise levels would be similar to existing noise levels at most recreational sites due to the distances between the Project and most areas used for recreation. Operational noise may be experienced by recreational users at the recreation areas that are closest to the Lease Boundary, such as Johnson Butte and the Horse Heaven Cemetery. The magnitude of potential impacts related to each recreational site during the operation of turbines within the study area is summarized in **Table 4.12-4**. Section 4.11 further describes the impacts and mitigation related to noise.

Operation of the Project would impact existing recreational paragliding and hang gliding activity based on launch and landing locations from example flight paths (Horse Heaven Wind Farm, LLC 2021c; Paragliding Forum n.d.).

The Project would pose a risk to paragliders and hang gliders who use the 20 launch sites known within the study area. The main risks would be:

- Losing safe landing space in the event of an in-flight emergency requiring an unanticipated landing in an area containing turbines and supporting infrastructure.
- Collision with a turbine or supporting infrastructure if a pilot loses the ability to steer mid-flight.
- Wind turbulence from operating turbines.

Activities during operation under Turbine Option 1 would result impacts on recreation resources as follows::

- **Recreation – Use:** Operation under Turbine Option 1 would limit recreational activities on public land in areas near construction, resulting in a low, long term, unavoidable impact on local recreation use.
- **Recreation – Recreational Experience:** Indirect impacts related to visual resources and noise produced by operation under Turbine Option 1 could occur at nearby recreation sites, resulting in a regional, long term, low, unavoidable impact on recreational sites beyond neighboring receptors.
- **Recreation – Public Health and Safety:** Operation under Turbine Option 2 would have the potential to affect the health and safety of paragliders and hang gliders regionally, resulting in a medium, unavoidable, long term impact for the life of the Project.

Turbine Option 2

Impacts on recreation during the Project's operation stage under Turbine Option 2 would be similar to those described for Turbine Option 1 and would be more distinct visually due to the increased height of the turbines. Impacts during operation under Turbine Option 2 are summarized below:

- **Recreation – Use:** Operation under Turbine Option 2 would limit recreational activities that occur on public land in areas near construction, resulting in a low, long term, and unavoidable impact on local recreation use.
- **Recreation – Recreational Experience:** Indirect impacts related to visual resources and noise produced by operation under Turbine Option 2 could occur at nearby recreation sites, resulting in a regional long term, low, and unavoidable impact on recreational sites beyond neighboring receptors.
- **Recreation – Public Health and Safety:** Operation under Turbine Option 2 would have the potential to affect the health and safety of paragliders and hang gliders regionally, resulting in a medium, unavoidable, long term impact for the life of the Project.

Solar Arrays

The three proposed solar arrays would have common impacts on recreation during the Project's operation stage. The impacts of the proposed solar arrays on recreation during this stage would be measurable and would affect recreational opportunities within the study area.

The County Well Road, Sellards Road, and Bofer Canyon solar arrays would be potentially visible from approximately 45 percent, 51 percent, and 31 percent, respectively, of the area located within 5 miles of the Project (Horse Heaven Wind Farm, LLC 2021a). The strong horizontal lines of the solar arrays would contrast with the organic forms and colors of the existing landform and vegetation. Section 4.10 describes the impacts on visual resources caused by operation of the solar arrays.

During operation of the solar arrays, noise would be associated with the transformers and inverters that support the solar array infrastructure. Electronic noise from inverters can be audible, but it is often reduced by a combination of shielding, noise cancellation, filtering, and noise suppression. Impacts from noise during operation of the solar arrays are not expected to affect recreational sites. See Section 4.11 for a detailed analysis of noise generated by construction of the turbines.

Operation of the solar arrays would pose a risk to paragliders and hang gliders. The main risk would be losing safe landing space in the event of an in-flight emergency requiring an unanticipated landing in an area containing solar arrays and supporting infrastructure. While some launch sites are seemingly distant from the solar arrays, flight records of over 60 miles have been recorded in the online paragliding database, and flight paths may traverse the Lease Boundary (Paragliding Forum n.d.).

The closest launch site to the proposed solar array located near Sellards Road is the McBee Road launch site, approximately 1 mile west of the solar siting area boundary. The closest launch site to the proposed solar array near County Well Road is also the McBee Road launch site, approximately 5 miles northwest of the solar siting area boundary. The closest launch site to the proposed solar array near the Bofer Canyon Substation is Jump Off Joe, approximately 2.7 miles northeast of the solar siting area boundary. Extra precautions would have to be taken by pilots if they needed to land near the solar fields.

Operation of the Sellards Solar Field would restrict access for recreationists. Sellards Solar Field would require a fence around the facility, which would include a parcel of DNR-administered land.

Activities during operation of the solar arrays would result in impacts on recreation resources:

- **Recreation – Use:** The Project's potential to affect access to public land resulting from the operation of the Sellards Solar Field would result in a limited, unavoidable, high, and long term impact.
- **Recreation – Recreational Experience:** Indirect impacts related to visual resources produced by the operation of the solar arrays could occur at recreation sites, resulting in a low, unavoidable impact on recreational sites regionally. The long term impacts would occur for the life of the Project.
- **Recreation – Public Health and Safety:** Operation under Turbine Option 2 would have the potential to affect the health and safety of paragliders and hang gliders regionally, resulting in a medium, unavoidable, long term impact for the life of the Project.

Battery Energy Storage Systems

The three proposed BESSs would have common impacts during the operation stage. The impacts of the proposed BESSs on recreation during the operation stage would be measurable and would impact recreational opportunities within the study area.

Visual impacts on recreation resources would be negligible due to the BESSs' low profile and features in the area being taller than the BESSs. Impacts from light and glare would be negligible. Visual impacts resulting from the operation of the BESSs are addressed in more detail in Section 4.10.

Noise from BESSs is typically associated with battery storage container ground-level cooling equipment and is not expected to impact recreational sites.

Operation of the BESSs is not expected to pose a risk to paragliders and hang gliders. The proposed disturbance footprint for the BESSs is negligible compared to other components, and paragliders and hang gliders are expected to be able to easily avoid landing within the fenced area of the BESSs.

Operation of the BESSs would result in negligible, long term, unlikely, local impacts on recreation resource use, experience, and public health and safety.

Substations

The five proposed substations would have common impacts during the operation stage. The impacts of the substations on recreation during the operation stage would be measurable and would affect recreational opportunities within the study area.

The substations and perimeter fencing would introduce vertical and geometric structures into the landscape. These features would contrast with the surrounding natural environment and would be visible from nearby recreation sites. Impacts from light and glare would be negligible. Visual impacts resulting from the operation of the substations are addressed in Section 4.10.

Operational noise levels would be similar to existing noise levels at most recreation sites due to the distances between the substations and most areas used for recreation. The primary ongoing noise sources at substations are the transformers, which generate sound generally described as a low humming. Circuit-breaker operations may also cause audible noise. Operational noise may be experienced by recreational users at the recreation areas that are closest to the Lease Boundary, such as Johnson Butte and the Horse Heaven Cemetery. Noise impacts resulting from operation of the substations are addressed in Section 4.11.

Operation of the substations is not expected to pose a risk to paragliders and hang gliders. The proposed disturbance footprint for the substations is negligible compared to other components, and paragliders and hang gliders are expected to be able to easily avoid landing within the fenced area of the substations.

Operation of the substations would have a small degree of impact on recreation sites and recreationists. Operation and maintenance activities are considered long term. Impacts on recreationists may occur beyond neighboring receptors. Activities during operation of the substations would result in negligible, long term, unlikely, local impacts on recreation resource use, experience, and public health and safety.

Comprehensive Project

The operation of the combined components would result in impacts on the safety of recreationists who paraglide and hang glide in the study area. Impacts related to visual resources could occur at recreation sites that give visitors potential unobstructed views of the Project’s infrastructure. Operation of the Sellards Solar Field would remove access to an entire parcel of DNR-administered land.

The Project’s potential to affect the health and safety of recreationists using the area for paragliding and hang gliding and limit access to recreation resources results in a medium impact. Operation of the comprehensive Project is long term. Impacts are unavoidable due to recreationists’ views, safety, and activities being affected. Impacts on recreationists could occur beyond neighboring receptors. Activities during operation under the comprehensive Project would result in medium, long term, unavoidable, regional impacts on recreation resources, as follows:

- **Recreation – Use:** The comprehensive Project's potential to affect the use of public land near the Project during operation of the turbines and access to public land resulting from the operation of the Sellards Solar Field would result in a local, unavoidable, high, long term impact.
- **Recreation – Recreational Experience:** Indirect impacts related to visual resources and noise produced by the operation of the comprehensive Project could occur at nearby recreation sites, resulting in a regional, unavoidable, low, long term impact for the life of the Project.
- **Recreation – Public Health and Safety:** The comprehensive Project's potential to affect the health and safety of paragliders and hang gliders would result in a regional, medium, and unavoidable, long term impact for the life of the Project.

4.12.2.3 Impacts during Decommissioning

The Project's decommissioning stage may result in impacts on recreation.

It is anticipated that the Applicant would either repower the facility or decommission the Project following the operational life of the facility.

Decommissioning activities could limit access to recreational facilities or conflict with recreational uses. Decommissioning would be performed in accordance with the Washington Energy Facility Site Evaluation Council's (EFSEC) mandates and prior Site Certification Agreements and would include the dismantling and removing of aboveground components, including turbines, solar arrays, substations, BESSs, and supporting infrastructure.

Impacts related to construction of the two turbine options and other components are described below and are similar to those described for the construction stage of the Project. Impacts of the decommissioning of the comprehensive Project are described last.

Turbine Option 1

Impacts on recreation during the Project's decommissioning stage under Turbine Option 1 would be measurable and would affect recreational opportunities within the study area.

During decommissioning, workers may seek accommodation in RV parks or campgrounds. Existing limits on the length of stay in public camping areas would minimize any potential impacts on park users. Benton County may experience small increases in costs for park use and recreation due to related temporary increases in population.

Impacts from light would be negligible, while impacts from glare would be low during decommissioning of the Project. Visual effects resulting from the decommissioning of the turbines, including light and glare, are addressed in more detail in Section 4.10.

Noise related to decommissioning would be temporary and would be noticeable at recreation sites that are close to the Lease Boundary. Noise could affect the recreational experience of those engaged in the use of multi-use trails, hunting on public lands, fishing, or camping nearby. See Section 4.11 for a detailed analysis of noise generated during the decommissioning of turbines.

During Project decommissioning, traffic impacts would be similar to those evaluated for construction. See Section 4.14 for a detailed analysis of traffic impacts and mitigation during decommissioning of the Project.

Decommissioning of turbines would reduce the risk to paragliders and hang gliders posed by both construction and operation of the Project; however, it is expected that the risk would remain until all turbines were removed. The main risks posed during decommissioning would be the loss of safe landing space in the event of an in-flight emergency requiring an unanticipated landing in an area containing the remaining infrastructure or turbines and supporting infrastructure being decommissioned with cranes.

Activities during decommissioning of the turbines would result in impacts on recreation resources, as follows:

- **Recreation – Use:** Decommissioning under Turbine Option 1 would limit recreational activities that occur on public land in areas near construction, resulting in a low, short term, and unavoidable impact on local recreation use.
- **Recreation – Recreational Experience:** Indirect impacts related to visual resources and noise produced by decommissioning under Turbine Option 1 could occur at nearby recreation sites, resulting in a short term, high, regional and unavoidable impact on recreational sites beyond neighboring receptors.
- **Recreation – Public Health and Safety:** Decommissioning under Turbine Option 1 would result in a regional, medium, unavoidable, short term impact mostly due to the impact on the public health and safety of paragliders and hang gliders.

Turbine Option 2

Impacts on recreation during the Project's decommissioning stage under Turbine Option 2 would be similar to those listed for Turbine Option 1, as follows:

- **Recreation – Use:** Decommissioning under Turbine Option 2 would limit recreational activities that occur on public land in areas near construction, resulting in a low, short term, and unavoidable impact on local recreation use.
- **Recreation – Recreational Experience:** Indirect impacts related to visual resources and noise produced by decommissioning under Turbine Option 2 could occur at nearby recreation sites, resulting in a short term, high, regional and unavoidable impact on recreational sites beyond neighboring receptors.
- **Recreation – Public Health and Safety** Decommissioning under Turbine Option 2 would result in a regional, medium, unavoidable, short-term impact mostly due to the impact on the public health and safety of paragliders and hang gliders.

Solar Arrays

The three proposed solar arrays would have common, measurable impacts on recreation during the decommissioning stage.

Depending on the location of a specific recreational resource, views of decommissioning activities may be fully or partially obstructed or viewers may have more wide-open views. Impacts from light and glare would be negligible. Visual effects resulting from decommissioning of the solar arrays are addressed in more detail in Section 4.10.

Noise related to decommissioning would be temporary and may be noticeable at recreation sites that are close to the Lease Boundary. Noise could affect the recreational experience of those engaged in hunting on public lands, fishing, or camping nearby. See Section 4.11 for a detailed analysis of noise generated during the decommissioning of the solar arrays.

Transportation-related impacts may occur on public roads used for existing recreational purposes during the decommissioning of solar arrays due to the transportation of materials. See Section 4.14 for a detailed analysis of traffic impacts and mitigation during decommissioning.

Decommissioning of solar arrays would reduce the risk to paragliders and hang gliders posed by both construction and operation of the solar arrays, but the risk would remain until all solar arrays are removed. The main risks posed during decommissioning would be the loss of safe landing space in the event of an in-flight emergency requiring an unanticipated landing in an area containing remaining infrastructure or solar arrays and supporting infrastructure being decommissioned.

Activities during decommissioning of the solar arrays would result in impacts on recreation resources, as follows:

- **Recreation – Use:** The Project's potential to affect access to public land resulting from the decommissioning of the Sellards Solar Field would result in a limited, unavoidable, high, and short term impact.
- **Recreation – Recreational Experience:** Indirect impacts related to visual resources produced by the decommissioning of the solar arrays could occur at recreation sites resulting in a high and unavoidable impact on recreational sites regionally. Impacts would be for the duration of decommissioning, or short term.
- **Recreation – Public Health and Safety:** Decommissioning of the solar arrays would have the potential to affect the health and safety of paragliders and hang gliders resulting in a regional, medium, unavoidable, short-term impact for the duration of decommissioning of the solar arrays.

Battery Energy Storage Systems

The three BESSs would have common, measurable impacts during the decommissioning stage.

Depending on the location of a specific recreational resource, views of decommissioning activities may be fully or partially obstructed or viewers may have more wide-open views. Impacts from light and glare would be negligible. Visual effects resulting from decommissioning of the BESSs are addressed in more detail in Section 4.10.

Noise related to decommissioning would be temporary and may be noticeable at nearby recreation sites. Noise could affect the recreational experience of those engaged in hunting on public lands, fishing, or camping nearby. See Section 4.11 for a detailed analysis of noise generated during the decommissioning of the BESSs.

No transportation-related impacts are expected for existing recreational uses during the decommissioning of BESSs. See Section 4.14 for a detailed analysis of traffic impacts and mitigation during operation.

The decommissioning of the BESSs is not expected to pose a risk to paragliders and hang gliders. The proposed disturbance footprint for the BESSs is negligible compared to other components, and paragliders and hang gliders are expected to be able to easily avoid landing within the fenced area of the BESSs during decommissioning.

Decommissioning activities for BESSs would result in negligible, temporary, feasible, local impacts on recreation resource use, experience, and public health and safety.

Substations

The five proposed substations would have common, measurable impacts on recreation during the decommissioning stage.

Depending on the location of a specific recreational resource, views of decommissioning activities may be fully or partially obstructed or viewers may have more wide-open views. Impacts from light and glare would be negligible. Visual effects resulting from decommissioning of the substations are addressed in more detail in Section 4.10.

Noise related to decommissioning would be temporary and may be noticeable at nearby recreation sites. Noise could affect the recreational experience of those engaged in hunting on public lands, fishing, or camping nearby. See Section 4.11 for a detailed analysis of noise generated during decommissioning of substations.

No transportation-related impacts are expected for existing recreational uses during decommissioning of substations since no road construction is required and decommissioning activities are unlikely to cause traffic delays. See Section 4.14 for a detailed analysis of traffic impacts and mitigation during operation.

The decommissioning of the substations is not expected to pose a risk to paragliders and hang gliders. The proposed disturbance footprint for the substations is negligible compared to other components, and paragliders and hang gliders are expected to be able to easily avoid landing within the fenced area of the substations during decommissioning.

Decommissioning activities for substations would result in negligible, temporary, feasible, local impacts on recreation resource use, experience, and public health and safety.

Comprehensive Project

The decommissioning of the Project's components would result in impacts on recreationists who paraglide and hang glide in the study area. Additionally, impacts related to visual resources and noise could occur at recreation sites. The decommissioning of the Project's components would also reduce the risk associated with construction and operation and maintenance stages.

Activities during the decommissioning of all components of the Project would result in impacts on recreation resources, as follows:

- **Recreation – Use:** The comprehensive Project's potential to affect the use of public land near the Project during the decommissioning of the turbines and access to public land resulting from the decommissioning of the Sellards Solar Field would result in a local, unavoidable, high, short term impact.
- **Recreation – Recreational Experience:** Indirect impacts related to visual resources and noise produced by decommissioning of the comprehensive Project could occur at nearby recreation sites, resulting in a regional, unavoidable, high, short term impact.
- **Recreation – Public Health and Safety:** The comprehensive Project's potential to affect the health and safety of paragliders and hang gliders would result in a regional, medium, short term, and unavoidable impact for the duration of decommissioning.

4.12.2.4 Summary of Impacts on Recreation Resources

The magnitude of impacts related to each recreational site within the study area is summarized in **Table 4.12-4**. The magnitude of impacts related to each recreational activity is summarized in **Table 4.12-5**.

Table 4.12-4: Summary of Impacts on Recreation Resources within the Study Area

Recreation Resource Name[a]	Recreation Activity Available[b]	Approximate Distance from Project (miles)[c]	Magnitude Impact of Turbine Option 1 and Turbine Option 2 (Summarized from Magnitude Ratings Described in Sections 4.10, 4.11, and 4.14)		
			Visual Impacts During Operation[d]	Noise and Vibration Impacts During Operation[e]	Transportation Impacts During Construction[f]
County and Regional Resources and Activities					
Badger Mountain Centennial Preserve		4	High	Negligible	Low
Boardman Parks and Recreation District		20.1	N/A	Negligible	Negligible
Candy Mountain Preserve		5	N/A	Negligible	Low
Horn Rapids Park		9	N/A	Negligible	Negligible
Horse Heaven Cemetery		0	N/A	Medium	Medium
Horse Heaven Vista		7	N/A	Negligible	Negligible
Hover Park		1.5	N/A	Low	Low
Rattlesnake Mountain Shooting Facility		8	N/A	Negligible	Negligible
Two Rivers Park		4.5	N/A	Negligible	Low
Vista Park		5	N/A	Negligible	Low
Wallula Gap Preserve		3	N/A	Low	Medium
State of Washington and Oregon Resources and Activities					
Chandler Butte		1.8	High	Low	Medium
Coyote Springs Wildlife Area		21	N/A	Negligible	Negligible
Goose Hill Butte		2	N/A	Low	Medium
Hat Rock State Park		8.1	N/A	Negligible	Negligible
Irrigon Wildlife Area		11	N/A	Negligible	Negligible
Johnson Butte		0	N/A	Medium	Medium
Jump Off Joe Butte		1.5	N/A	Low	Medium
Sacajawea Historical State Park		5.2	N/A	Negligible	Low
Federal Resources and Activities					
Charbonneau Park		12.5	N/A	Negligible	Negligible
Cold Springs National Wildlife Refuge		11.3	N/A	Negligible	Negligible
Crow Butte Park		22.2	N/A	Negligible	Negligible
Fishhook Park		18.5	N/A	Negligible	Negligible
Hanford Reach National Monument		14.3	N/A	Negligible	Negligible
Hood Park		6.5	N/A	Negligible	Low
Irrigon Fish Hatchery		13.9	N/A	Negligible	Negligible
Juniper Dunes OHV Area / ACEC Wilderness Area		15.3	N/A	Negligible	Negligible
McBee Trailhead (Horse Heaven Hills)		1.5	High	Low	Medium
McNary National Wildlife Refuge		2.7	Medium	Low	Low
Saddle Mountain National Wildlife Refuge		8.7	N/A	Negligible	Negligible
Sand Station Recreation Area (Lake Wallula)		8	N/A	Negligible	Negligible
Sunnyside Wildlife Management Area		15	N/A	Negligible	Negligible
Umatilla National Wildlife Refuge		11.4	N/A	Negligible	Negligible
Washington Farm Service Agency Tracts		24.7	N/A	Negligible	Negligible

Notes:

(a) There are 208 small local parks found within the study area. These various parks are shown in Figures 3.12-1 through 3.12-4 but are not listed individually in this table.

(b) = Biking; = Boating; = Camping; = Fishing; = Golfing; = Hiking; = Hunting on public lands; = OHV Area; = Paragliding; = Playground/Recreational Equipment; = Scenic View or Visual Attraction including Sites with Historical Significance; = Shooting Range; = Swimming; = Wildlife Viewing and Bird Watching

(c) Horse Heaven Wind Farm, LLC 2021a

(d) Impacts related to visual setting (including light and glare) are addressed in Section 4.10. Magnitude is provided for what was analyzed during operation.

(e) Impacts related to noise and vibration are addressed in Section 4.11. Magnitude is provided for what was analyzed during operation.

(f) Impacts related to traffic are addressed in Section 4.14. Magnitude is provided for what was analyzed during construction.

ACEC = Area of Critical Environmental Concern; BLM = Bureau of Land Management; Const. = Construction; Decom = Decommissioning; N/A – Not Analyzed due to lack of key observation point; NPS = National Park Service; O&M = Operation and Maintenance; OHV = off-highway vehicle

Table 4.12-5: Impacts from Turbine Option 1 and Turbine Option 2 on Recreation Resources within the Study Area by Resource Activity

Recreation Resource Type	Magnitude Impact of Turbine Option 1 and Turbine Option 2 (Summarized from Magnitude Ratings Described in Sections 4.10, 4.11, and 4.14)		
	Visual Impacts During Operation[(a)]	Noise Impacts During Operation[(b)]	Transportation Impacts During Construction[(c)]
Biking	High	Low	Medium
Boating	N/A	Negligible	Low
Camping	N/A	Negligible	Low
Fishing	N/A	Low	Low
Golfing	N/A	Negligible	Low
Hiking	High	Medium	Medium
Hunting on Public Lands	Medium	Low	Low
OHV	N/A	Negligible	Negligible
Paragliding	High	Low	Medium
Parks with Playground/Recreational Equipment	N/A	Negligible	Low
Scenic View or Visual Attraction including Sites with Historical Significance	High	Medium	Medium
Shooting Range	N/A	Negligible	Negligible
Wildlife Viewing and Bird Watching	High	Low	Low

Notes:
(a) Impacts related to visual setting (including light and glare) are addressed in Section 4.10. Magnitude is provided for what was analyzed during operation.
(b) Impacts related to noise and vibration are addressed in Section 4.11. Magnitude is provided for what was analyzed during operation.
(c) Impacts related to traffic are addressed in Section 4.14. Magnitude is provided for what was analyzed during construction.
N/A – Not Analyzed due to lack of key observation point; OHV = off-highway vehicle

4.12.2.5 Applicant Commitments and Identified Mitigation

This section describes measures that would reduce or compensate for impacts related to recreation from construction, operation, and decommissioning of the Project. These measures would be implemented in addition to compliance with the environmental permits, plans, and authorizations required for the Proposed Action.

Applicant Commitments

The Applicant has identified measures and/or best practices that are intended to prevent or minimize potential impacts on the affected environment for the Project. Measures presented by the Applicant in the ASC (Horse Heaven Wind Farm, LLC 2021a) and taken into consideration in the characterization of potential impacts on recreation resources are discussed in Section 2.3 and summarized below.

- The Applicant would construct support facilities with non-reflective materials in muted tones and would use white or light gray, non-reflective paint on turbines to reduce the need for daytime aviation lighting and minimize glare from the turbines as required by Federal Aviation Administration Advisory Circular 70/7460-1M.

- As applicable, Project construction and operation would follow site-specific best management practices to minimize potential impacts on noise, traffic, and visual surroundings, as described in the respective resource sections of this application.

Recommended Mitigation Measures

EFSEC has identified the following additional and modified mitigation measures for the Project to avoid and/or minimize potential impacts on recreation resources:

R-1[34]: To mitigate the loss of recreational activities due to the Project, the Certificate Holder would coordinate with DNR and Benton County to identify new recreational activities and/or improve existing recreational activities within the Lease Boundary (e.g., multi-use trails).

R-2: To mitigate the loss of uninterrupted views of scenic viewpoints, the Certificate Holder would provide a minimum of five informational boards approved by DNR and EFSEC at viewpoints associated with scenic areas of interest. These boards should include photographs of the viewshed prior to the construction of the Project and provide information regarding the decommissioning and reclamation of the Project's footprint.

R-3: To mitigate the loss of safe recreation use for recreation enthusiasts, the Certificate Holder would coordinate with local and regional (when appropriate) recreation groups (e.g., the Northwest Paragliding Club, the Tri-City Bicycle Club) to develop and maintain an adaptive safety management plan to continue access to recreation activities in the Project area while keeping recreation enthusiasts safe. This plan should identify potential hazards within the Project Area (e.g., construction on or near common bicycle paths, no fly zones, etc.) and provide opportunities to identify or improve other similar recreation use areas to offset any recreation removed from the Project area as a result of the Project. Specific to paragliding, the Certificate Holder would perform outreach to other regional paragliding entities to share the safety management plan to ensure that recreationists are aware of the limitations the Project creates for safe landing and safe air space.

4.12.2.6 Significant Unavoidable Adverse Impacts

Determining the significance of an impact involves context and intensity, which, in turn, depend on the magnitude and duration of an impact. "Significant" in the Washington State Environmental Policy Act means a reasonable likelihood of more than a moderate adverse impact on environmental quality. An impact may also be significant if its chance of occurrence is not great, but the resulting environmental impact would be severe if it occurred (WAC 197-11-794).

This Draft Environmental Impact Statement weighs the potential impacts on land and shoreline use that may result from the Proposed Action with mitigation and makes a resulting determination of significance for each impact, as listed in **Tables 4.12-6a, 4.12-6b, and 4.12-6c**.

[34] R-: Identifier of numbered mitigation item for Recreation

Table 4.12-6a: Summary of Potential Impacts on Recreation during Construction of the Proposed Action

Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact: • Negligible • Low • Medium • High	Duration of Impact: • Temporary • Short Term • Long Term • Constant	Likelihood of Impact: • Unlikely • Feasible • Probable • Unavoidable	Spatial Extent or Setting of Impact: • Limited • Confined • Local • Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Recreation – Use	Turbine Option 1 Turbine Option 2	Construction of the turbines would limit recreational activities that occur on public land in areas near construction, as well as impede cyclists' use of established routes during the transportation of equipment and materials.	Medium	Short Term	Unavoidable	Local	**R-1:** Work with DNR and Benton County to identify new recreational activities and/or improve existing recreational activities within Lease Boundary (e.g., multi-use trails)	None identified
Recreation – Use	Solar Arrays	Construction of the Sellards Solar Field would restrict access to a parcel of DNR-administered land within the Lease Boundary resulting in a high impact.	High	Long Term	Unavoidable	Limited	**R-1:** Work with DNR and Benton County to identify new recreational activities and/or improve existing recreational activities within Lease Boundary (e.g., multi-use trails)	None identified
Recreation – Use	BESSs Substations	Construction of the BESSs and Substations would cause a negligible impact on recreationists.	Negligible	Temporary	Feasible	Local	No mitigation identified	None identified
Recreation – Use	**Comprehensive Project**	Construction of the comprehensive Project would result in a high impact due to the restriction of access to public land and recreational activities that occur on public land within the Project's construction area. The impact would be long term for the duration of the life of the Project, unavoidable, and local.	High	Long Term	Unavoidable	Local	**R-1:** Work with DNR and Benton County to identify new recreational activities and/or improve existing recreational activities within Lease Boundary (e.g., multi-use trails) **R-2:** Provide informational boards, as approved by DNR and EFSEC, at viewpoints associated with scenic areas of interest **R-3:** Work with the local and regional clubs to provide and maintain a plan to keep recreationalists safe	None identified
Recreation – Recreational Experience	Turbine Option 1 Turbine Option 2 Solar Arrays **Comprehensive Project**	Indirect impacts related to visual resources and noise could occur at recreation sites.	High	Long Term	Unavoidable	Regional	**R-2:** Provide informational boards, as approved by DNR and EFSEC, at viewpoints associated with scenic areas of interest.	None identified
Recreation – Recreational Experience	BESSs Substations	Construction of the BESSs and Substations would cause a negligible impact on recreationists.	Negligible	Temporary	Feasible	Local	No mitigation identified	None identified
Recreation – Public Health and Safety	Turbine Option 1 Turbine Option 2 Solar Arrays **Comprehensive Project**	The Project's potential to affect the health and safety of recreationists using the area for paragliding, hang gliding, or biking would result in a medium impact.	Medium	Long Term	Unavoidable	Regional	**R-3:** Work with the local and regional clubs to provide and maintain a plan to keep recreationalists safe	None identified

Table 4.12-6a: Summary of Potential Impacts on Recreation during Construction of the Proposed Action

Topic	Component[a]	Description of Impact[b]	Magnitude of Impact: • Negligible • Low • Medium • High	Duration of Impact: • Temporary • Short Term • Long Term • Constant	Likelihood of Impact: • Unlikely • Feasible • Probable • Unavoidable	Spatial Extent or Setting of Impact: • Limited • Confined • Local • Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Recreation – Public Health and Safety	BESSs Substations	Construction of the BESSs and Substations would cause a negligible impact on recreationists.	Negligible	Temporary	Feasible	Local	No mitigation identified	None identified

Notes:
[a] The impacts related to each component, including "comprehensive Project," were rated separately; components were combined in the same cell if they received the same impact ratings for the identified topic.
[b] Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.
[c] Mitigation measures listed here are additional actions that EFSEC could impose to further reduce the impacts. See Section 4.1 Introduction for details.
[d] Significant unavoidable impacts are those that would remain even after all identified additional mitigation measures have been required by EFSEC.
BESS = battery energy storage system; DNR = Washington Department of Natural Resources; EFSEC = Washington Energy Facility Site Evaluation Council

Table 4.12-6b: Summary of Potential Impacts on Recreation during Operation of the Proposed Action

Topic	Component[a]	Description of Impact[b]	Magnitude of Impact: • Negligible • Low • Medium • High	Duration of Impact: • Temporary • Short Term • Long Term • Constant	Likelihood of Impact: • Unlikely • Feasible • Probable • Unavoidable	Spatial Extent or Setting of Impact: • Limited • Confined • Local • Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Recreation – Use	Turbine Option 1 Turbine Option 2	Turbines would limit recreational activities (i.e., paragliding) that occur on public land near areas of operation.	Low	Long Term	Unavoidable	Local	**R-1:** Work with DNR and Benton County to identify new recreational activities and/or improve existing recreational activities within Lease Boundary (e.g., multi-use trails)	None identified
Recreation – Use	Solar Arrays	Operation of the Sellards Solar Field would restrict access to a parcel of DNR-administered land within the Lease Boundary.	High	Long Term	Unavoidable	Limited	**R-1:** Work with DNR and Benton County to identify new recreational activities and/or improve existing recreational activities within Lease Boundary (e.g., multi-use trails)	None identified
Recreation – Use	BESSs Substations	Operation of the BESSs and substations would cause a negligible impact on recreationists.	Negligible	Long Term	Unlikely	Local	No mitigation identified	None identified
Recreation – Use	**Comprehensive Project**	Operation of the comprehensive Project would result in a high impact due to the restriction of access to public land and recreational activities that occur on public land near the Project. The impact would be long term for the duration of the life of the Project, unavoidable, and local.	High	Long Term	Unavoidable	Local	**R-1:** Work with DNR and Benton County to identify new recreational activities and/or improve existing recreational activities within Lease Boundary (e.g., multi-use trails) **R-2:** Provide informational boards, as approved by DNR and EFSEC, at viewpoints associated with scenic areas of interest **R-3:** Work with the local and regional clubs to provide and maintain a plan to keep recreationalists safe	None identified
Recreation – Recreational Experience	Turbine Option 1 Turbine Option 2 Solar Arrays **Comprehensive Project**	Impacts on noise receptors would be limited, while visual impacts would occur regionally.	Low	Long Term	Unavoidable	Regional	**R-2:** Provide informational boards, as approved by DNR and EFSEC, at viewpoints associated with scenic areas of interest	None identified
Recreation – Recreational Experience	BESSs Substations	Operation of the BESSs and substations would cause a negligible impact on recreationists.	Negligible	Long Term	Unlikely	Local	No mitigation identified	None identified
Recreation – Public Health and Safety	Turbine Option 1 Turbine Option 2 Solar Arrays **Comprehensive Project**	The Project's potential to affect the health and safety of recreationists using the area for paragliding and hang gliding would results in a medium impact during the life of the Project. Impacts on recreationists would occur beyond neighboring receptors.	Medium	Long Term	Unavoidable	Regional	**R-3:** Work with the local and regional clubs to provide and maintain a plan to keep recreationalists safe	Significant for paragliding and hang gliding public health and safety

Table 4.12-6b: Summary of Potential Impacts on Recreation during Operation of the Proposed Action

Topic	Component[a]	Description of Impact[b]	Magnitude of Impact: • Negligible • Low • Medium • High	Duration of Impact: • Temporary • Short Term • Long Term • Constant	Likelihood of Impact: • Unlikely • Feasible • Probable • Unavoidable	Spatial Extent or Setting of Impact: • Limited • Confined • Local • Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Recreation – Public Health and Safety	BESSs Substations	Operation of the BESSs and substations would cause a negligible impact on recreationists.	Negligible	Long Term	Unlikely	Local	No mitigation identified	None identified

Notes:
[a] The impacts related to each component, including "comprehensive Project," were rated separately; components were combined in the same cell if they received the same impact ratings for the identified topic.
[b] Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.
[c] Mitigation measures listed here are additional actions that EFSEC could impose to further reduce the impacts. See Section 4.1 Introduction for details.
[d] Significant unavoidable impacts are those that would remain even after all identified additional mitigation measures have been required by EFSEC.
BESS = battery energy storage system; DNR = Washington Department of Natural Resources; EFSEC = Washington Energy Facility Site Evaluation Council

Table 4.12-6c: Summary of Potential Impacts on Recreation during Decommissioning of the Proposed Action

Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact: • Negligible • Low • Medium • High	Duration of Impact: • Temporary • Short Term • Long Term • Constant	Likelihood of Impact: • Unlikely • Feasible • Probable • Unavoidable	Spatial Extent or Setting of Impact: • Limited • Confined • Local • Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Recreation – Use	Turbine Option 1 Turbine Option 2	Decommissioning would result in impacts on recreationists who use the Project's study area for recreational activities. Paragliders, hang gliders, and cyclists would be affected by the decommissioning of the Project.	Low	Short Term	Unavoidable	Local	**R-1:** Work with DNR and Benton County to identify new recreational activities and/or improve existing recreational activities within Lease Boundary (e.g., multi-use trails) **R-3:** Work with the local and regional clubs to provide and maintain a plan to keep recreationalists safe	None identified
Recreation – Use	Solar Arrays	Decommissioning of the Sellards Solar Field would restrict access to a parcel of DNR-administered land within the Lease Boundary, resulting in a high impact.	High	Short Term	Unavoidable	Limited	**R-1:** Work with DNR and Benton County to identify new recreational activities and/or improve existing recreational activities within Lease Boundary (e.g., multi-use trails)	None identified
Recreation – Use	BESSs Substations	Decommissioning of the BESSs and substations would cause a negligible impact on recreationists.	Negligible	Temporary	Feasible	Local	No mitigation identified	None identified
Recreation – Use	**Comprehensive Project**	Decommissioning of the comprehensive Project would result in a high impact due to the restriction of access to public land and recreational activities that occur on public land near the Project. The impact would be short term for the duration of decommissioning, unavoidable, and local.	High	Short Term	Unavoidable	Local	**R-1:** Work with DNR and Benton County to identify new recreational activities and/or improve existing recreational activities within Lease Boundary (e.g., multi-use trails) **R-2:** Provide informational boards, as approved by DNR and EFSEC, at viewpoints associated with scenic areas of interest **R-3:** Work with the local and regional clubs to provide and maintain a plan to keep recreationalists safe	None identified
Recreation – Recreational Experience	Turbine Option 1 Turbine Option 2 Solar Arrays **Comprehensive Project**	Indirect impacts related to visual resources and noise could occur at recreation sites. Impacts on noise receptors would occur locally, while visual impacts would occur at a regional spatial extent.	High	Short Term	Unavoidable	Regional	**R-2:** Provide informational boards, as approved by DNR and EFSEC, at viewpoints associated with scenic areas of interest	None identified
Recreation – Recreational Experience	BESSs Substations	Construction of the BESSs and substations would cause a negligible impact on recreationists.	Negligible	Temporary	Feasible	Local	No mitigation identified	None identified
Recreation – Public Health and Safety	Turbine Option 1 Turbine Option 2 Solar Arrays **Comprehensive Project**	The Project's potential to affect the health and safety of recreationists using the area for paragliding, hang gliding, or biking would result in a medium impact.	Medium	Short Term	Unavoidable	Regional	**R-3:** Work with the local and regional clubs to provide and maintain a plan to keep recreationalists safe	None identified

Table 4.12-6c: Summary of Potential Impacts on Recreation during Decommissioning of the Proposed Action

Topic	Component[a]	Description of Impact[b]	Magnitude of Impact: • Negligible • Low • Medium • High	Duration of Impact: • Temporary • Short Term • Long Term • Constant	Likelihood of Impact: • Unlikely • Feasible • Probable • Unavoidable	Spatial Extent or Setting of Impact: • Limited • Confined • Local • Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Recreation – Public Health and Safety	BESSs Substations	Construction of the BESSs and substations would cause a negligible impact on recreationists.	Negligible	Temporary	Feasible	Local	No mitigation identified	None identified

Notes:
[a] The impacts related to each component, including "comprehensive Project," were rated separately; components were combined in the same cell if they received the same impact ratings for the identified topic.
[b] Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.
[c] Mitigation measures listed here are additional actions that EFSEC could impose to further reduce the impacts. See Section 4.1 for details.
[d] Significant unavoidable impacts are those that would remain even after all identified additional mitigation measures have been required by EFSEC.
BESS = battery energy storage system; DNR = Washington Department of Natural Resources; EFSEC = Washington Energy Facility Site Evaluation Council

4.12.3 Impacts of No Action Alternative

Under the No Action Alternative, impacts related recreation from the construction, operation, and decommissioning of the Proposed Action would not occur. For the purpose of this analysis, it is assumed that no future development would occur within the Lease Boundary.

This Page Intentionally Left Blank

4.13 Public Health and Safety

This section describes potential impacts on public health and safety from the proposed Horse Heaven Wind Farm (Project, or Proposed Action) or under the No Action Alternative. Agencies and medical facilities providing public health and safety services (e.g., law enforcement, fire protection, and medical emergency services) within the vicinity of the Project Lease Boundary are identified in Section 3.13. As referenced in Section 3.13, Benton County Emergency Services is made up of two divisions: the Southeast Communications Center and Benton County Emergency Management. The two divisions assist emergency responders and promote community safety by coordinating incident response. Section 4.12 Recreation presents an analysis of recreational safety within the Project vicinity and Lease Boundary.

Background

Washington Administrative Code (WAC) 463-60-352 sections (1) through (6) require an applicant for site certification to provide information pertaining to the following:

- Noise, also required under the Washington State Environmental Policy Act (SEPA) in WAC 197-11-960(7)(b) (WAC 463-60-352[1])
- Risk of fire or explosion, also required under SEPA in WAC 197-11-960(7) (WAC 463-60-352[2])
- Potential releases to the environment affecting public health (such as toxic or hazardous materials), also required under SEPA in WAC 197-11-960(7) (WAC 463-60-352[3])
- Safety standards compliance (WAC 463-60-352[4])
- Radiation levels (WAC 463-60-352[5])
- Emergency plans, also required under SEPA in WAC 197-11-960(7) (WAC 463-60-352[6])

SEPA also requires an applicant to address the potential increased need for public services (WAC 197-11-960[15]).

Sections 3.11 and 4.11 of this Draft Environmental Impact Statement (EIS) describe existing conditions and potential impacts related to noise. Radiation levels are not applicable to the Project or the No Action Alternative and are therefore not discussed in this Draft EIS.

Security measures to limit public access to Project components during construction, operation, and decommissioning are described in Section 2.19 of the Application for Site Certification (ASC) and include temporary (safety) fencing, permanent fencing, warning signs, and locks on equipment and Project facilities (Horse Heaven Wind Farm, LLC 2021). The Washington Energy Facility Site Evaluation Council (EFSEC) considers these measures sufficient to prevent injury to the public from the Project and therefore focuses the impact assessment in Sections 4.13.2 and 4.13.3 on risks and impacts associated with fires, explosions, or potential releases of hazardous materials to the environment within the vicinity of the Project Lease Boundary.

Section 3.13 describes the network of available public services, including emergency management, law enforcement, fire protection, and health services (hospitals and health care facilities) that would respond to public health and safety emergencies. The available systems are extensive and could respond to fires, explosions, or potential releases of hazardous materials to the environment within the vicinity of the Project Lease Boundary (unless noted otherwise in this section).

4.13.1 Method of Analysis

In accordance with SEPA, this Draft EIS weighs the likelihood of occurrence with the severity of an impact (WAC 197-11-794) and considers several factors when determining the significance of identified potential impacts (WAC 197-11-330 and WAC 197-11-794). The impact rating is summarized in **Table 4.13-1**.

Table 4.13-1: Impact Rating Table for Public Health and Safety from Section 4.1

Factor	Rating →			
Magnitude	**Negligible** indistinguishable from the background	**Low** small impact, non-sensitive receptor(s)	**Medium** intermediate impact, may occur on sensitive receptor(s) or affect public health and safety	**High** large impact on sensitive receptor(s) or affecting public health and safety
Duration	**Temporary** infrequently during any stage	**Short Term** duration of construction or site restoration	**Long Term** during operation or operation plus another stage of Project	**Constant** during life of Project and/or beyond the Project
Likelihood	**Unlikely** not expected to occur	**Feasible** may occur	**Probable** expected to occur	**Unavoidable** inevitable
Spatial Extent/Setting	**Limited** small area of Lease Boundary or beyond Lease Boundary if duration is temporary	**Confined** within Lease Boundary	**Local** beyond Lease Boundary to neighboring receptors	**Regional** beyond neighboring receptors

Table 4.13-2 defines the qualitative framework used herein to rank the magnitude of impact and presents impact magnitude with respect to public services and health services.

Table 4.13-2: Criteria for Assessing Magnitude of Impacts on Public Health and Safety

Magnitude of Impacts	Description
Negligible	**Smoke and haze:** No risk of smoke or haze from accidental fire. **Hazardous materials release:** A release of hazardous materials would not be possible. **Emergency services:** Response times of emergency services would remain unchanged.
Low	**Smoke and haze:** Smoke and haze may occur, but any accidental fire would be easily contained and not pose a health or safety concern. **Hazardous materials release:** Hazardous materials may be used or stored on site, but in small quantities that could be easily contained. **Emergency services:** Emergency response times would not be altered, and there would be no effect on the community or on-site personnel.
Medium	**Smoke and haze:** Smoke and haze generated by accidental fires could be measurably increased and may affect public health. Moderate amounts of combustible materials may be used or stored on site. **Hazardous materials release:** Hazardous materials may be used or stored on site, in quantities that could pose a health risk if a release were to occur. **Emergency services:** Emergency response times could be altered to a level that would affect the local community or safety of on-site personnel.
High	**Smoke and haze:** Smoke and haze from accidental fire would measurably affect public health. Large amounts of combustible materials may be used or stored on site. **Hazardous materials release:** Hazardous materials would be used or stored on site, in quantities that would pose a severe health risk if a release were to occur. **Emergency services:** Emergency response times could be altered to a level that would severely affect the local community or safety of on-site personnel

4.13.2 Impacts of the Project

4.13.2.1 Impacts during Construction

The Project's construction stage could result in the risk of fire or spills of fuels or lubricants from construction equipment (Section 4.1.2 of the ASC) (Horse Heaven Wind Farm, LLC 2021). Fires may occur as a result of the fuel combustion process associated with construction equipment or generators used on site. Vegetation could pose a fire risk if allowed to grow into the clearance area of power line conductors. The Project would be situated on vacant land with dryland vegetation cover and few trees. The risk of fire would be higher in summer and fall than in winter and spring. Horse Heaven Wind Farm, LLC's (Applicant) commitments to mitigate fire risk and impacts are discussed in Section 4.13.2.4.

The Lease Boundary is dominated by rolling hills bisected by meandering canyons, some of which constitute ephemeral or intermittent drainages. During construction, small quantities of a few hazardous materials (e.g., cleaners, insecticides or herbicides, paint, or solvents) may be utilized in the construction yards. These materials would be stored in a secure location within the construction yards when not in use.

The Applicant anticipates that up to 500 gallons of diesel fuel and 200 gallons of gasoline may be kept on site during construction for fueling of equipment. Fuels would be stored in temporary aboveground tanks in the construction yard(s), within an area providing secondary containment. Only small quantities of other hazardous materials would be stored or used during construction.

In addition, up to three diesel-powered generators may be required during turbine commissioning. Each generator can hold up to 1,250 gallons of fuel in a tank within a secondary containment system. Supplementing the generator tanks, a 3,000-gallon diesel fuel tank with its own secondary containment system may be on site during turbine commissioning (approximately 19 weeks total) to minimize the need for refueling deliveries.

Most fuel would be delivered to the construction yard by a licensed specialized tanker vehicle on an as-needed basis. Only small quantities of lubricating oils, hydraulic fluid for construction equipment, or other hazardous materials would be maintained on site during construction. Lubricating oil or hydraulic fluids for construction equipment would similarly be brought in as needed for equipment maintenance by a licensed contractor using a specialized vehicle, and waste oils removed by a similarly licensed maintenance contractor. Hydraulic oils for the turbines and dielectric oils for the transformers would also be brought in on an as needed basis and be transferred into the receiving components; none would be stored on site.

In the unlikely event of an accidental hazardous material release, the contaminated material or soils would be cleaned up and disposed of, and treated according to applicable regulations. Spill kits containing items such as absorbent pads would be located on equipment and in on-site temporary storage facilities to respond to accidental spills if any were to occur. Employees handling hazardous materials would be instructed in the proper handling and storage of these materials and the locations of spill kits. Further mitigation to reduce the potential for impacts related to hazardous materials releases is described in Section 4.13.2.4.

Turbine Option 1

Risks related to public health and safety from turbine construction under Turbine Option 1 include the general risks associated with construction equipment and use described above, as well as the following risks specific to turbines:

- Turbines may pose a fire risk due to the combustible materials and lubricants contained in the nacelles.
- Diesel-powered generators that may be used during initial turbine commissioning could pose a fire risk due to the fuel combustion process.

Fire may result from turbine construction under Turbine Option 1 due to existing site conditions and the nature of construction activities. However, potential impacts related to fire could be meaningful, as wildfire risk in the area is considered high (Section 3.13.2.1). Impacts of a fire would be medium, temporary, feasible, and limited in spatial extent. Both emergency responders and residents within and near the Lease Boundary would experience direct impacts (Section 3.13). One of the two fire districts servicing the Lease Boundary is reliant on neighboring fire agencies for structure firefighting (Section 3.13), so suppression of fire in a turbine tower could be delayed. Indirect impacts of fire on members of the public at a distance from the Lease Boundary (e.g., in the Tri-Cities area) could include smoke or haze and a potential reduction in the availability of emergency responders. These impacts would be medium, temporary, feasible, and regional in spatial extent.

Impacts from turbine construction under Turbine Option 1 associated with releases to the environment that may affect public health would be medium in severity but temporary, unlikely, and limited in spatial extent. Emergency responders would experience direct impacts (Section 3.13), but residents are not expected to experience direct impacts (few are located near the Wind Energy Micrositing Corridor, where the turbines would be located). Indirect impacts associated with releases to the environment are not expected.

Turbine Option 2

Although the lower number of turbines under Turbine Option 2 (up to 150 turbines) compared to Turbine Option 1 (up to 244 turbines) poses an inherently lower fire risk, public health and safety impacts resulting from fire under Turbine Option 2 would be from the same as Turbine Option 1 (medium in severity, but temporary, feasible, and limited in spatial extent). Indirect impacts of fire on members of the public at a distance from the Lease Boundary (e.g., in the Tri-Cities area) could include smoke or haze and a potential reduction in the availability of emergency responders. These impacts would be medium, temporary, feasible, and regional in spatial extent.

Although the lower number of turbines under Turbine Option 2 (up to 150 turbines) compared to Turbine Option 1 (up to 244 turbines) poses an inherently lower risk of spills specific to combustible materials and lubricants in turbines, the impacts on public health and safety resulting from releases of hazardous materials under Turbine Option 2 would not be different from Turbine Option 1 (medium in severity but temporary, unlikely, and limited in spatial extent). Indirect impacts associated with releases to the environment are not expected.

Solar Arrays

Risks related to public health and safety from solar array construction include the general risks of construction equipment and use. A fire resulting from solar array construction would be medium in severity, temporary, unlikely, and limited in spatial extent. However, potential impacts related to fire could be meaningful, as wildfire risk in the area is considered high (Section 3.13.2.1). Indirect impacts of fire on members of the public at a distance from the Lease Boundary (e.g., in the Tri-Cities area) could include smoke or haze and a potential reduction in the availability of emergency responders. These impacts would be medium, temporary, unlikely, and regional in spatial extent.

There is little risk of a hazardous material release to the environment from solar arrays; inverter station transformers contained within solar arrays include small amounts of oil. Impacts associated with releases to the environment from solar array construction that may affect public health would be medium in severity but temporary, unlikely, and limited in spatial extent. Emergency responders would experience direct impacts (Section 3.13), but residents are not expected to experience direct impacts; few residents are located immediately adjacent to each proposed solar array location. Indirect impacts associated with releases to the environment are not expected.

Battery Energy Storage Systems

Risks related to public health and safety from battery energy storage system (BESS) construction would include the general risks associated with construction equipment and use and the following risks specific to BESSs:

- Lithium-ion battery storage may pose a risk of fire and explosion due to the tendency for lithium-ion batteries to overheat (flammable electrolyte products can vaporize, vent from cells, and ignite on contact with an ignition source).
- Lithium-ion batteries and lead-acid batteries contain hazardous materials, which could pose a potential for release to the environment if handled improperly.

A fire resulting from BESS construction would be medium in severity, temporary, unlikely, and limited in spatial extent. However, the potential impacts related to fire could be meaningful, as wildfire risk in the area is considered high (Section 3.13.2.1). Indirect impacts of fire on members of the public at a distance from the Lease Boundary (e.g., in the Tri-Cities area) could include smoke or haze and a potential reduction in the availability of emergency responders. These impacts would be medium, temporary, unlikely, and regional in spatial extent.

Impacts associated with releases to the environment from BESS construction that may affect public health would be medium in severity but temporary, unlikely, and limited in spatial extent. Emergency responders would experience direct impacts (Section 3.13), but residents are not expected to experience direct impacts; few to no residents are located immediately adjacent to each BESS, depending on its specific location. Indirect impacts associated with releases to the environment are not expected.

Substations

Risks from substation construction related to public health and safety include the general risks of construction equipment and use. A fire resulting from substation construction would be medium in severity, temporary, unlikely, and limited in spatial extent. However, the potential impacts related to fire could be meaningful, as wildfire risk in the area is considered high (Section 3.13.2.1). Indirect impacts of fire on members of the public at a distance from the Lease Boundary (e.g., in the Tri-Cities area) could include smoke or haze and a potential reduction in the availability of emergency responders These impacts would be medium, temporary, unlikely, and regional in spatial extent.

There is little risk of hazardous material release to the environment from substations; transformers in each substation contain small amounts of oil. Impacts associated with releases to the environment from substation construction that may affect public health would be medium in severity but temporary, unlikely, and limited in spatial extent. Emergency responders would experience direct impacts (Section 3.13), but residents are not expected to experience direct impacts; few to no residents are located immediately adjacent to each substation, depending on its specific location. Indirect impacts associated with releases to the environment are not expected.

Comprehensive Project

Construction of the Project as a whole could result in both direct and indirect impacts on public health and safety. Direct impacts related to fire would be medium in severity but temporary, feasible, and limited in spatial extent. Indirect impacts related to fire would also be medium in severity, temporary, and feasible, but regional in spatial extent.

Impacts associated with releases to the environment from Project construction that may affect public health would be medium in severity but temporary, unlikely, and limited in spatial extent. Emergency responders could experience direct impacts (Section 3.13), but residents are not expected to experience direct impacts; few residents are located near the Micrositing Corridor, where the turbines would be located, or to the other Project components. Indirect impacts associated with releases to the environment are not expected.

4.13.2.2 Impacts during Operation

Turbine Option 1

Direct and indirect impacts on public health and safety resulting from turbine operation under Turbine Option 1 would be similar to those described for construction under Turbine Option 1, although with a lower rating for likelihood. Spontaneous fire or explosions from operating wind turbines are rare, although not unheard of; one study estimated one fire per year for every 19,230 turbines operating worldwide (Carbon Brief 2014). There are approximately 2,000 wind turbines in Washington State (Hoen et al. 2018). A fire that burned approximately 250 acres in Klickitat County, Washington, occurred in 2019 when a wind turbine's generator caught fire, causing sections of the turbine to melt and then fall to the ground (Carter 2019). Direct impacts on public health and safety would be low in severity and temporary, unlikely, and limited in spatial extent. One of the two fire districts servicing the Lease Boundary is reliant on neighboring fire agencies for structure firefighting (Section 3.13), so fire suppression at a turbine tower could be delayed. Indirect impacts from smoke or haze would be low in severity, temporary, unlikely, and regional in spatial extent.

There is little risk of hazardous material release to the environment from turbine operation under Turbine Option 1; turbine gearboxes contain small amounts of oil and lubricants that are unlikely to be released outside the turbine during maintenance. The Applicant has identified multiple actions to prevent or respond to spills (Section 2.10 of the ASC) (Horse Heaven Wind Farm, LLC 2021). Releases to the environment from turbine operation are not expected to impact public health and safety.

Turbine Option 2

Direct and indirect impacts on public health and safety resulting from turbine operation under Turbine Option 2 would be similar to those described for Turbine Option 2 construction, with a lower rating for likelihood. Although the lower number of turbines under Turbine Option 2 (up to 150 turbines) compared to Turbine Option 1 (up to 244 turbines) poses an inherently lower risk of occurrence of fire, direct impacts on public health and safety from turbine operation under Turbine Option 2 would be low in severity but temporary, unlikely, and limited in spatial extent. Indirect impacts from smoke or haze would be low in severity, temporary, unlikely, and regional in spatial extent.

There is little risk of hazardous material release to the environment from turbine operation under Turbine Option 2; turbine gearboxes contain small amounts of oil and lubricants that are unlikely to be released outside the turbine during maintenance. The Applicant has identified multiple actions to prevent or respond to spills (Section 2.10 of the ASC) (Horse Heaven Wind Farm, LLC 2021). Releases to the environment from turbine operation are not expected to impact public health and safety.

Solar Arrays

There is no expectation of risk from fire associated with operation of solar arrays. There is little risk of hazardous material release to the environment from solar arrays; inverter station transformers contained within solar arrays include small amounts of oil that could be released if not properly maintained. The Applicant has identified multiple actions to prevent or respond to spills (Section 2.10 of the ASC) (Horse Heaven Wind Farm, LLC 2021). Fire or releases to the environment from solar array operation are not expected to impact public health and safety.

Battery Energy Storage Systems

Direct and indirect impacts on public health and safety resulting from BESS operation would be similar to those described for BESS construction. A fire resulting from BESS operation would be low to medium, temporary, feasible, and limited in spatial extent. The potential impacts related to fire could be meaningful, as wildfire risk in the area is considered high (Section 3.12.2.1). Indirect impacts of fire on the public at a distance from the Lease Boundary (e.g., in the Tri-Cities area) could include smoke or haze and a potential reduction in availability of emergency responders. These impacts would be low, temporary, feasible, and regional in spatial extent.

There is little risk of hazardous material release to the environment from BESSs; lithium-ion batteries and lead-acid batteries contain hazardous materials that could pose the potential for release to the environment if not properly maintained. The Applicant has identified multiple actions to prevent or respond to spills (Section 2.10 of the ASC) (Horse Heaven Wind Farm, LLC 2021). Releases to the environment from solar array operation are not expected to impact public health and safety.

Substations

There is a minimal expectation of risk from fire or explosion associated with substation transformers during Project operation. The Applicant's commitments to mitigate fire risk and impacts are discussed in Section 4.13.2.4. Direct impacts on public health and safety would be medium in severity and temporary, feasible, and limited in spatial extent. Indirect impacts from smoke or haze would be low, temporary, unlikely, and regional in spatial extent.

There is little risk of hazardous material release to the environment from substations; transformers contain small amounts of oil that may be released if not properly maintained. The Applicant has identified multiple actions to prevent or respond to spills (Section 2.10 of the ASC) (Horse Heaven Wind Farm, LLC 2021). Fire or releases to the environment from substation operation are not expected to impact public health and safety.

Comprehensive Project

Operation of the Project as a whole could result in both direct and indirect impacts on public health and safety, although these impacts are unlikely. Direct impacts on public health and safety from fire could be low to medium in severity and temporary, feasible, and limited in spatial extent. Indirect impacts from smoke or haze could be low to medium in severity, temporary, feasible, and regional in spatial extent. Releases to the environment from operation of the Project are not expected to impact public health and safety.

4.13.2.3 Impacts during Decommissioning

Turbine Option 1

Direct and indirect impacts on public health and safety during decommissioning of turbines under Turbine Option 1 would be similar to those described for construction under Turbine Option 1. Direct impacts related to fire would be medium in severity, and temporary, feasible, and limited in spatial extent. Indirect impacts related to smoke and haze would also be medium, temporary, and feasible, but regional in spatial extent.

Impacts associated with releases to the environment that may affect public health would be medium in severity but temporary, unlikely, and limited in spatial extent. Emergency responders would experience direct impacts (Section 3.13), but residents are not expected to experience direct impacts (few residents are located near the Micrositing Corridor, where the turbines would be located). Indirect impacts associated with releases to the environment are not expected.

Turbine Option 2

Direct and indirect impacts on public health and safety during decommissioning of turbines under Turbine Option 2 would be similar to those described for construction under Turbine Option 2. Direct impacts related to fire would be medium in severity, and temporary, feasible, and limited in spatial extent. Indirect impacts related to smoke and haze would also be medium, temporary, and feasible, but regional in spatial extent.

Impacts associated with releases to the environment that may affect public health would be medium in severity but temporary, unlikely, and limited in spatial extent. Emergency responders would experience direct impacts (Section 3.13), but residents are not expected to experience direct impacts (few residents are located near the Micrositing Corridor, where the turbines would be located). Indirect impacts associated with releases to the environment are not expected.

Solar Arrays

Direct and indirect impacts on public health and safety during decommissioning of solar arrays would be similar to those described for the construction of the solar arrays. A fire resulting from solar array decommissioning would be medium in severity but would be temporary, unlikely, and limited in spatial extent. Indirect impacts related to smoke and haze would be medium, temporary, unlikely, and regional in spatial extent.

There is little risk of hazardous material release to the environment from solar arrays; inverter station transformers contained within solar arrays include small amounts of oil. Impacts associated with releases to the environment from solar array decommissioning that may affect public health would be medium in severity but temporary, unlikely, and limited in spatial extent. Emergency responders would experience direct impacts (Section 3.13), but residents are not expected to experience direct impacts (few to no residents are located immediately adjacent to each proposed solar array location). Indirect impacts associated with releases to the environment are not expected.

Battery Energy Storage Systems

Direct and indirect impacts on public health and safety during decommissioning of the BESSs would be similar to those described for BESS construction. A fire resulting from BESS decommissioning would be medium in severity but is considered temporary, unlikely, and limited in spatial extent. Indirect impacts would be medium, temporary, unlikely, and regional in spatial extent.

Impacts associated with releases to the environment from BESS decommissioning that may affect public health would be medium in severity but temporary, unlikely, and limited in spatial extent. Emergency responders would experience direct impacts (Section 3.13), but residents are not expected to experience direct impacts (few to no residents are located immediately adjacent to each BESS, depending on its specific location). Indirect impacts associated with releases to the environment are not expected.

Substations

Direct and indirect impacts on public health and safety during decommissioning of the substations would be similar to those described for the construction of the substations. A fire resulting from substation decommissioning would be medium in severity but would be temporary, unlikely, and limited in spatial extent. Indirect impacts related to smoke and haze would be medium in severity, temporary, unlikely, and regional in spatial extent.

There is little risk of hazardous material release to the environment from substations; transformers in each substation contain small amounts of oil. Impacts associated with releases to the environment from substation decommissioning that may affect public health would be medium in severity but temporary, unlikely, and limited in spatial extent. Emergency responders would experience direct impacts (Section 3.13) but residents are not expected to experience direct impacts (few to none are immediately adjacent to each substation, depending on its specific location). Indirect impacts associated with releases to the environment are not expected.

Comprehensive Project

Decommissioning of the Project as a whole could result in both direct and indirect impacts on public health and safety. Direct impacts related to fire would be medium in severity, but temporary, feasible, and limited in spatial extent. Indirect impacts related to smoke and haze would also be medium in severity, temporary, and feasible, but regional in spatial extent.

Impacts associated with releases to the environment from Project decommissioning that may affect public health would be medium in severity but temporary, unlikely, and limited in spatial extent. Emergency responders would experience direct impacts (Section 3.13), but residents are not expected to experience direct impacts; few residents are located near the Micrositing Corridor, where the turbines would be located, or to the other Project components. Indirect impacts associated with releases to the environment are not expected.

4.13.2.4 Applicant Commitments and Identified Mitigation

This section describes measures that would reduce or compensate for impacts related to public health and safety from construction, operation, and decommissioning of the Project. These measures would be implemented in addition to compliance with the environmental permits, plans, and authorizations required for the Proposed Action.

Applicant Commitments

The Applicant has identified measures and/or best practices that are designed to prevent or minimize potential impacts on the affected environment for the Project. Measures presented by the Applicant in the ASC (Horse Heaven Wind Farm, LLC 2021) and taken into consideration in the characterization of potential impacts on public health and safety are discussed in Section 2.3 and 4.1.2 of the ASC and summarized below.

The Applicant and its contractors would comply with applicable federal, state, and local health and safety standards, including:

- Occupational Safety and Health Act of 2000
- Applicable Standards from WAC 296-155, Safety Standards for Construction Work
- Uniform Fire Code
- Uniform Fire Code Standards
- Uniform Building Code
- National Fire Protection Association Standards
- National Institute for Occupational Safety and Health
- American Society of Mechanical Engineers, design standards
- American National Standards Institute, design standards
- National Electric Safety Code
- American Concrete Institute Standards

All facilities would be designed per the recommendations of the Institute of Electrical and Electronics Engineering Guide for Substation Fire Protection (979-2012) and the Unified Facilities Criteria (UFC) for Fire Protection Engineering for Facilities (UFC 3-600-01). During construction of the Project, trees and vegetation that pose a hazard to the collector lines may be topped or cleared from the right-of-way. During operation and maintenance, vegetation that is overgrown and could pose a hazard to the transmission line would be topped or cleared on an as-needed basis. BESSs and diesel-powered generators would include fire suppression measures. Appropriate coordination with local emergency personnel would be conducted. Precautionary measures would be taken during construction to reduce fire risk. Construction equipment would be monitored where activities may present safety issues.

The Applicant has identified multiple actions to prevent or respond to spills (Section 2.10 of the ASC) (Horse Heaven Wind Farm, LLC 2021).

The Applicant would coordinate with local emergency services personnel (Section 3.13) and provide training to them where necessary. The Applicant would prepare and submit the following emergency plans to EFSEC for approval prior to construction (unless otherwise noted):

- Emergency Action Plan
- Safety Manual
- Spill Prevention, Control, and Countermeasures (SPCC) Plan (Construction)
- SPCC Plan (Operations, to be submitted prior to operations)
- Stormwater Pollution Prevention Plan (Construction)

The construction contractor would be responsible for implementing the applicable plans during construction.

Recommended Mitigation Measures

EFSEC has identified the following additional and modified mitigation measures for the Project to avoid and/or minimize potential impacts on public health and safety.

Veg-1[35]: Tree Avoidance: Construction would avoid removing or disturbing trees within the Project Lease Boundary. Disturbance to trees includes any disturbance, including topping, within the drip-line of the tree (i.e., the area from the edge of the outermost branches), which preserves an intact root system. Disturbance within the drip-line of the tree should be avoided as this can lead to tree mortality. The avoidance area within the drip-line of trees in work areas should be delineated using snow fencing or similar measure to improve the visibility of avoidance zones. Trees cannot be removed without pre-approval. Where tree disturbance cannot be avoided by the Project (e.g., near transmission lines), the number and location of the trees would be provided to EFSEC, along with a statement justifying why avoidance cannot be achieved, and a mitigation plan. The mitigation plan would include replanting trees within the Lease Boundary to maintain the diversity of habitat structures provided by trees and would require approval by EFSEC prior to proceeding. This mitigation measure avoids physical disturbance to trees, which provide structural diversity for wildlife habitat.

4.13.2.5 Significant Unavoidable Adverse Impacts

Determining the significance of an impact involves context and intensity, which in turn depend on the magnitude and duration of an impact. "Significant" in SEPA means a reasonable likelihood of more than a moderate adverse impact on environmental quality. An impact may also be significant if its chance of occurrence is not great, but the resulting environmental impact would be severe if it occurred (WAC 197-11-794).

[35] Veg-: Identifier of numbered mitigation item for Vegetation

This Draft EIS weighs the potential impacts on public health and safety that may result from the Project with mitigation and makes a resulting determination of significance for each impact, shown in **Tables 4.13-3a, 4.13-3b, and 4.13-3c**.

Table 4.13-3a: Summary of Potential Impacts on Public Health and Safety during Construction of the Proposed Action

Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact: ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact: ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact: ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact: ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Fire (Worker Health and Safety)	Turbine Option 1 Turbine Option 2 **Comprehensive Project**	Fire resulting from Project construction is unlikely, but wildfire risk in the area is considered high. For instance, combustible materials and lubricants are contained in the nacelle of the turbines. Diesel-powered generators may be used during construction. Use of these materials could pose a fire risk.	Medium	Temporary	Feasible	Limited	**Veg-1:** Pre-approval from EFSEC before topping or removal of trees that pose a hazard to collector lines	None identified
Smoke and Haze (Public Health)	Turbine Option 1 Turbine Option 2 **Comprehensive Project**	Fire resulting from Project construction is unlikely, but wildfire risk in the area is considered high. For instance, combustible materials and lubricants are contained in the nacelle of the turbines. Diesel-powered generators may be used during construction. Use of these materials could pose a fire risk.	Medium	Temporary	Feasible	Regional	**Veg-1:** Pre-approval from EFSEC before topping or removal of trees that pose a hazard to collector lines	None identified
Fire (Worker Health and Safety)	Solar Arrays BESSs Substations	Fire resulting from solar array, substation, and BESS construction is unlikely, but wildfire risk in the area is considered high.	Medium	Temporary	Unlikely	Limited	**Veg-1:** Pre-approval from EFSEC before topping or removal of trees that pose a hazard to collector lines	None identified
Smoke and Haze (Public Health)	Solar Arrays BESSs Substations	If a fire were to occur during construction of the solar arrays, substation, or BESSs, indirect impacts could include smoke or haze, and a potential reduction in emergency response services.	Medium	Temporary	Unlikely	Regional	**Veg-1:** Pre-approval from EFSEC before topping or removal of trees that pose a hazard to collector lines	None identified
Release of Hazardous Materials	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Hazardous materials, including diesel fuel, lubricating oils, hydraulic fluid, paints, and solvents would be used and stored on site. Spill kits would be maintained, minimizing the risk of a release if a spill were to occur.	Medium	Temporary	Unlikely	Limited	**Veg-1:** Pre-approval from EFSEC before topping or removal of trees that pose a hazard to collector lines	None identified

Notes:
(a) The impacts related to each component, including “comprehensive Project,” were rated separately; components were combined in the same cell if they received the same impact ratings for the identified topic.
(b) Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.
(c) Mitigation measures listed here are additional actions that EFSEC could impose to further reduce the impacts. See Section 4.1 Introduction for details.
(d) Significant unavoidable impacts are those that would remain even after all identified additional mitigation measures have been required by EFSEC.
BESS = battery energy storage system; EFSEC = Washington Energy Facility Site Evaluation Council

Table 4.13-3b: Summary of Potential Impacts on Public Health and Safety during Operation of the Proposed Action

Topic	Component[a]	Description of Impact[b]	Magnitude of Impact: ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact: ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact: ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact: ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Fire (Worker Health and Safety)	Turbine Option 1 Turbine Option 2	Spontaneous fire or explosions from operating wind turbines are rare but could occur during Project operations.	Low	Temporary	Unlikely	Limited	No mitigation identified	None identified
Fire (Worker Health and Safety)	Substations	Substation transformers have a minimal risk of fire or explosion during construction.	Medium	Temporary	Feasible	Limited	No mitigation identified	None identified
Fire (Worker Health and Safety)	BESSs **Comprehensive Project**	Lithium-ion batteries used for the BESSs may pose a risk of fire and explosion during operation because they may overheat, but the BESSs would include a fire suppression system.	Low to Medium (based on seasonal fire weather conditions)	Temporary	Feasible	Limited	No mitigation identified	None identified
Smoke and Haze (Public Health)	Turbine Option 1 Turbine Option 2 BESSs Substations	Indirect impacts if a fire were to occur during operation of the turbines and substation could include smoke or haze, and a potential reduction in emergency response services.	Low	Temporary	Unlikely	Regional	No mitigation identified	None identified
Release of Hazardous Materials	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Project elements include small amounts of oil and batteries, but a release is unlikely to occur during operations.	Negligible	Temporary	Unlikely	Limited	No mitigation identified	None identified

Notes:
(a) The impacts related to each component, including “comprehensive Project,” were rated separately; components were combined in the same cell if they received the same impact ratings for the identified topic.
(b) Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.
(c) Mitigation measures listed here are additional actions that EFSEC could impose to further reduce the impacts. See Section 4.1 Introduction for details.
(d) Significant unavoidable impacts are those that would remain even after all identified additional mitigation measures have been required by EFSEC.
BESS = battery energy storage system; EFSEC = Washington Energy Facility Site Evaluation Council

Table 4.13-3c: Summary of Potential Impacts on Public Health and Safety during Decommissioning of the Proposed Action

Topic	Component[a]	Description of Impact[b]	Magnitude of Impact: ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact: ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact: ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact: ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Fire (Worker Health and Safety)	Turbine Option 1 Turbine Option 2 **Comprehensive Project**	Combustible materials and lubricants are contained in the nacelle of the turbines. Diesel-powered generators may be used during decommissioning. Use of these materials could pose a fire risk.	Medium	Temporary	Feasible	Limited	No mitigation identified	None identified
Fire (Worker Health and Safety)	Solar Arrays BESSs Substations	Fire resulting from decommissioning BESSs, solar array, and substations is unlikely, but wildfire risk in the area is considered high.	Medium	Temporary	Unlikely	Limited	No mitigation identified	None identified
Smoke and Haze (Public Health)	Turbine Option 1 Turbine Option 2 **Comprehensive Project**	If a fire were to occur during turbine decommissioning, indirect impacts could include smoke or haze, and a potential reduction in emergency response services.	Medium	Temporary	Feasible	Regional	No mitigation identified	None identified
Smoke and Haze (Public Health)	Solar Arrays BESSs Substations	If a fire were to occur during decommissioning of the solar arrays, substation, or BESSs, indirect impacts could include smoke or haze, and a potential reduction in emergency response services.	Medium	Temporary	Unlikely	Regional	No mitigation identified	None identified
Release of Hazardous Materials	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Project elements include small amounts of oil, which could be released during decommissioning.	Medium	Temporary	Unlikely	Limited	No mitigation identified	None identified

Notes:
(a) The impacts related to each component, including "comprehensive Project," were rated separately; components were combined in the same cell if they received the same impact ratings for the identified topic.
(b) Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.
(c) Mitigation measures listed here are additional actions that EFSEC could impose to further reduce the impacts. See Section 4.1 Introduction for details.
(d) Significant unavoidable impacts are those that would remain even after all identified additional mitigation measures have been required by EFSEC.
BESS = battery energy storage system; EFSEC = Washington Energy Facility Site Evaluation Council

4.13.3 Impacts of No Action Alternative

Under the No Action Alternative, impacts related to public health and safety from the construction, operation, and decommissioning of the Project would not occur. For the purpose of this analysis, it is assumed that no future development would occur within the Lease Boundary.

This Page Intentionally Left Blank

4.14 Transportation

This section describes the impacts on transportation that could result from the proposed Horse Heaven Wind Farm, LLC's (Applicant) proposed Horse Heaven Wind Farm (Project, or Proposed Action) or under the No Action Alternative. Section 3.14 identifies transportation facilities within the study area for the Project. The study area for the transportation analysis includes roadway intersections, railroad mainlines, and waterway freight corridors in the vicinity of the Project, which is defined as approximately 4 miles south/southwest of the city of Kennewick, Washington, and the larger Tri-Cities urban area along the Columbia River. Transportation systems beyond the Washington border, including analysis of Interstate 84 (I-84), are not included in this assessment.

Impacts are analyzed for construction, operation and decommissioning of the Project. Laws and regulations that are now current may be different at decommissioning, and there is no way to anticipate how or if laws and regulations may change. The analysis of impacts from decommissioning is based on existing laws and regulations at the moment in time the Application for Site Certification (ASC) was submitted to the Washington Energy Facility Site Evaluation Council (EFSEC). EFSEC may request that additional studies be completed as a form of mitigation prior to the decommissioning of the Project.

4.14.1 Method of Analysis

In accordance with the Washington State Environmental Policy Act, this Draft Environmental Impact Statement (EIS) weighs the likelihood of occurrence with the severity of an impact (Washington Administrative Code [WAC] 197-11-794) and considers several factors when determining the significance of identified potential impacts (WAC 197-11-330 and WAC 197-00-794). The impact rating is summarized in **Table 4.14-1**.

Table 4.14-1: Impact Rating Table for Transportation from Section 4.1

Factor	Rating →			
Magnitude	**Negligible** indistinguishable from the background	**Low** small impact, non-sensitive receptor(s)	**Medium** intermediate impact, may occur on sensitive receptor(s) or affect public health and safety	**High** large impact on sensitive receptor(s) or affecting public health and safety
Duration	**Temporary** infrequently during any stage	**Short Term** duration of construction or site restoration	**Long Term** during operation or operation plus another stage of Project	**Constant** during life of Project and/or beyond the Project
Likelihood	**Unlikely** not expected to occur	**Feasible** may occur	**Probable** expected to occur	**Unavoidable** inevitable
Spatial Extent/Setting	**Limited** small area of Lease Boundary or beyond Lease Boundary if duration is temporary	**Confined** within Lease Boundary	**Local** beyond Lease Boundary to neighboring receptors	**Regional** beyond neighboring receptors

Table 4.14-2 defines the qualitative framework used herein to rank the magnitude impact for transportation.

Table 4.14-2: Criteria for Assessing Magnitude of Impacts on Transportation

Magnitude of Impacts	Description
Negligible	**Level of Service:** A decrease in LOS would not occur. **Access:** No impact expected to a public resource or private residence. **Roadway Safety:** There is no potential for roadway safety to decrease.
Low	**Level of Service:** Traffic volumes would increase, but a decrease in LOS is not expected. **Access:** Impacts could occur for access to public resources or private residences, but impacts would not be frequent during any stage of the Project. **Roadway Safety:** There is no potential for roadway safety to decrease.
Medium	**Level of Service:** Traffic volumes would increase measurably with the potential in LOS to decrease, but still be maintained at performance standards adopted in the transportation element of the Benton County Comprehensive Plan (Benton County 2021). **Access:** Impacts would be expected to occur for access to public resources or private residences. Impacts could occur frequently. **Roadway Safety:** Increased traffic on highways/freeways, at intersections or railroad crossing have the potential to decrease roadway safety.
High	**Level of Service:** Traffic volumes would increase measurably, and the LOS would decline below the performance standards adopted in the transportation element of the Benton County Comprehensive Plan (Benton County 2021). **Access:** Impacts would occur for access to public resources or private residences. Impacts would occur frequently and for measurable lengths of time. **Roadway Safety:** Increased traffic on highways/freeways, at intersections or railroad crossing are expected to decrease roadway safety.

LOS = level of service

Roadway-related impacts were evaluated based on standards, guidelines, and procedures published in the Highway Capacity Manual (TRB 2016). The transportation impact analysis included traffic count data assembled by the Washington State Department of Transportation (WSDOT) and presented on the WSDOT Traffic Volume Map (WSDOT 2019).

This Draft EIS considers the impact of the Project as a whole. To align the impact rating system described by the Applicant's transportation impact analysis in the ASC, this evaluation of transportation analyzes potential impacts from the Proposed Action in the context of the Applicant's example of a phased approach to construction:

- Phase 1 construction could generate power via wind and solar. Phase 1 could also include a battery energy storage system (BESS) capable of storing energy.
  - Phase 2 construction is divided into Phase 2a and Phase 2b, summarized as follows:
  - Phase 2a could consist of the construction of both wind and solar facilities. The Applicant's Phase 2a scenario also includes the construction of a BESS.
  - Phase 2b could increase power generation via the construction of additional wind turbines, but construction would not include a BESS.

Chapter 2 contains more information on the Applicant's example of a phased approach to construction. The construction schedule, including phasing of specific elements of the Project, could alter the details of the analysis. Additional analysis would be required to confirm what impact the combining of construction phases would have on traffic volume. The ASC suggests that any construction traffic volume increases from combining the two phases are expected to be minimal and unlikely to affect the analysis for the phased approach.

4.14.2 Impacts of Proposed Action

Impacts on vehicular traffic from the Project are expected and are described for the construction, operation, and decommissioning of the Project in Sections 4.14.2.1, 4.14.2.2, and 4.14.2.3, respectively.

Transportation Systems

A source haul route has not been finalized. The designated haul routes and methods of transport would be a commercial decision and an element of the negotiated purchase agreement. Development of some of the required information, such as source location for products, detailed schedule, and structural assessment of existing transportation systems, would be provided following turbine selection. EFSEC will review final commercial decisions to determine if additional environmental analysis is needed.

Wind energy components for similar projects, including tower sections, nacelle and turbines, and blades, have been shipped to either a western U.S. port or overland on the interstate highway system. The U.S. ports near the Project site are the Port of Longview and the Port of Vancouver, from which components would be transported by specialized trucks along interstate, state, county, and private roadways. Rail transportation could also be utilized, as there are rail facilities south of the Lease Boundary.

New access roads, constructed within the Lease Boundary, would be owned and maintained by the Applicant; the general public would not have access to these roads during construction, operation, or decommissioning of the Project. All work done on existing Benton County roads would be performed in accordance with Benton County standard plans and with review and approval by the County Engineer (Benton County n.d.).

Vehicular Traffic

Approximately 29 intersections, not including new Project access roads, are present in the Project vicinity that would be utilized for the Project. A subset of seven intersections was chosen to provide an estimate of the largest potential site-wide level of service (LOS) impacts. Benton County's designated LOS is "C." A roadway meets an LOS C standard when traffic flow remains uninterrupted, even at peak hours, by congestion or delays related to traffic volume and configuration (Benton County 2021). When new demands on the service system exhaust the available capacity and decrease the LOS below the designated LOS of C, new capacity must be created. Typically, new capacity is created by modifying the geometrics of the roadway (e.g., adding a new traffic lane, turning lane, widening shoulders, etc.).

Impacts of the construction, operation, and decommissioning of the Project on vehicular traffic are assessed in this analysis.

Air Traffic

A Federal Aviation Administration (FAA) Determination of No Hazard to Air Navigation would have to be obtained for the Project. Minimal glare is anticipated from the Project's solar arrays (see Section 4.10). The Project would adhere to all FAA and Benton County development regulations as they pertain to turbine siting and safety.

The FAA developed Federal Aviation Regulation (FAR) Part 103 to regulate certain piloted “vehicles” flown for recreation and sport purposes. Such ultralight vehicles are described in FAR 103.1 and include what are commonly known as paragliders, hang gliders, ultralights, powered paragliders, and powered parachutes. FAR Part 103 states that an ultralight vehicle cannot be used in commercial operations or operated in any manner that creates a hazard to persons or property. It cannot be operated over any congested area, over an open-area assembly of persons, or any airport traffic area, any air traffic control zone, or any area covered by airport radar service. The paragliding and hang gliding recreational activities are analyzed in Section 4.12.

Impacts on commercial air traffic are not expected and are not discussed further in this analysis.

Waterborne and Rail Traffic

Some Project components may be delivered to ports, such as the Port of Vancouver or Port of Longview, for Project construction. Detailed transportation plans, including port delivery locations and long-range transport routes, would be developed following turbine selection. No Project construction activities would interfere with existing waterborne or rail transportation in Benton or Franklin County, and if components are delivered to a port, it would be a facility accustomed to handling large deliveries and capable of managing components such as those required for a wind farm.

Impacts on waterborne traffic are not analyzed in further detail herein.

Rail transportation could be utilized as there are Burlington Northern-Santa Fe Railway facilities near the Lease Boundary. As rail transportation was not considered in the ASC, this Draft EIS does not include a determination of impact on railroad operations.

Rail transportation is not analyzed in further detail herein.

Parking

Parking during construction and decommissioning (e.g., of construction vehicles) would occur at construction laydown yards and within the Wind Energy Micrositing Corridor. These parking locations would not impede or displace any existing parking areas in the study area.

Once constructed, the operations and maintenance (O&M) facilities would have parking areas for operations vehicles. Plans for maintenance and runoff control from the parking areas at the O&M facilities would be dictated by the Erosion and Sediment Control Plan, including the best management practices, and a Stormwater Pollution Prevention Plan. The Project would not displace any existing private parking within the area, and no impacts related to existing parking would occur.

Parking is not analyzed in further detail herein.

Movement/Circulation of People or Goods

Interstate 82 (I-82) is a four-lane divided highway, allowing for movement or circulation of people around larger loads exiting the interstate. Multipurpose use (e.g., vehicular, bicycle, pedestrian) of existing rights-of-way on existing roads would be maintained during construction, operation, and decommissioning of the Project. No multipurpose use of new Project access roads would occur during construction, as the new Project roads would not be open to the public. Potential impacts on the movement/circulation of people or goods, in relation to the broader element of transportation, are assessed in this analysis.

Traffic Hazards

Traffic hazards associated with construction projects are generally related to accident occurrence. There are no railroad crossings, school zones, or dedicated pedestrian crossings within the Lease Boundary. School zones that exist within the study area for the Project are described in Section 3.14.

Railroad crossings and other grade fluctuations pose high levels of risk for oversized loads with low ground clearance. The hazards include the fact that trains cannot stop quickly. Railroad crossings that are in the vicinity of the Project (USDOT n.d.) and that could intersect the assumed transport routes of materials for the Project are discussed in Section 3.14.

Traffic counts for rail crossings were not provided in the ASC but would be included in the required traffic analysis, as discussed in Section 4.14.2.4. All crossings except Crossing 928192L are located above (via an overpass) or under (via an underpass) the transport route. Crossing 928192L along Dallas Road is a grade crossing, meaning that the crossing occurs at the same grade as other traffic. Stopping distances for passenger trains are comparable to those for freight trains. A 150-car freight train at 50 miles per hour (mph) needs 8,000 feet to stop, and an eight-car passenger train at 79 mph needs about 6,000 feet to stop (USDOT 2020).

Traffic hazards occur with all projects, especially projects that require work zones for maintaining and upgrading roadways. Daily changes in traffic patterns, narrowed rights-of-way, and other construction activities often create a combination of factors resulting in crashes, injuries, and fatalities (USDOT FHWA 2021).

4.14.2.1 Impacts during Construction

During peak construction, a typical day would include the transportation of workers, transportation of materials, and movement of heavy equipment.

On-site workers would include technicians, laborers, foremen, equipment operators, and construction managers, with approximately 62 percent of these positions expected to be filled by workers normally residing in Benton and Franklin Counties (Horse Heaven Wind Farm, LLC 2021). Most of the construction worker traffic would originate from the Tri-Cities of Kennewick, Pasco, and Richland, as well as nearby communities. The workforce would use the same roads to access the Project as the equipment transporters. To be conservative with analysis, it is assumed that workers would drive alone and that the average vehicle would only have 1.25 occupants (Horse Heaven Wind Farm, LLC 2021). Private vehicles would primarily travel mornings and evenings, corresponding to the workday, and the construction truck traffic would be more uniformly distributed throughout the workday. For the LOS analysis, the more conservative 374 worker trips for the construction of the first half of the Project and 344 worker trips for the construction of the second half of the Project were used. Three Project laydown yard locations have been preliminarily identified:

- One adjacent to the eastern substation location on Beck Road
- One adjacent to the primary Badger Canyon Road substation
- One adjacent to the alternate western substation

During construction, trucks would use I-82, State Route 397, State Route 221, and local Benton County roads to bring construction equipment, turbine components, solar components, substation equipment, and transmission line equipment to the various Project construction sites.

Trucks would also be used to bring road base aggregate to improve existing roads and construct new access roads; concrete for the turbine, substation, BESS, and O&M facility foundations; and water for dust control. Some large Project components such as turbine blades, tower components, and nacelles may be delivered to remote ports, such as the Port of Vancouver or Port of Longview, and transported overland via I-84 to I-82. Other components may originate within the continental United States and be transported overland from other locations to I-84 and on to I-82 (Horse Heaven Wind Farm, LLC 2021).

Typical construction equipment used in the construction of wind and solar facilities is listed in **Table 4.14-3**. Two to three laydown yards would be established within the Lease Boundary, likely adjacent to the eastern and western substation locations, to facilitate the delivery and assembly of materials and equipment. Equipment such as excavators, trenching equipment, backhoe loaders, cranes, forklifts, and other material handling equipment would be brought on site by a flatbed semi-tractor trailer and would remain on site throughout construction. Equipment such as water trucks, fuel trucks, service trucks, and trucks delivering components would make frequent trips to deliver supplies. Some trucks would be required to obtain oversize/overweight permits, which allow travel on all unrestricted roads.

Table 4.14-3: Construction Equipment

Type of Equipment	Construction Use
Heavy Vehicles	
Bulldozer (medium)	Access road and driveway leveling
Scraper	Access road and driveway leveling
Drum Compactor	Compacting
Skid Steer Loader	Light soils work for slabs and foundations
Road Grader	Access road and driveway leveling
Excavator	Trenching and foundations
Trenching Equipment/Cable Plows	Trenching
Backhoe Loader	Moving materials
Tracked Pile Driver	Driving piles into ground
Cable Reel Truck	Dispensing cable
Concrete Pump Truck	Delivering concrete
Mobile Hydraulic Crane/Truck Mounted Crane	Moving materials
2,000 kW Generators	Turbine Commissioning
Load Banks	Turbine Commissioning
Large Crawler Crane	Moving materials
Water Trucks	Dust control
Fuel Trucks	Refueling equipment
Non-heavy Vehicles	
Forklifts/Telehandler	Moving materials, loading and unloading of trucks
Personnel Transport Vehicles	Transporting workers
Other Material Handling Equipment	Moving materials
Service Trucks	Maintaining heavy equipment
Other Equipment	
Disposal Containers	Disposing of and removing construction debris
Other General Industrial Equipment	Assembling structures
Plate Compactors/Jumping Jacks	Compacting soil for concrete slabs and foundations
Pressure Washers	Cleaning
Storage Containers	Storing on-site materials
Welders	Assembling structures

Source: Horse Heaven Wind Farm, LLC 2021
kW = kilowatt

Some of the private roads would require upgrading to accommodate the truck traffic associated with the Project's construction. TLG Transport (TLG) reviewed whether trucking configurations for towers and blades could reach proposed pad sites along proposed access routes within the Project (Horse Heaven Wind Farm, LLC 2021; Appendix V). TLG's assessment was conducted using preliminary information provided by the Applicant. The report may not represent a complete list of all necessary improvements, as changes to the site design may require additional improvements as the Project evolves. The road improvement information provided would be updated when turbine selection and layout have been finalized. Preliminary road intersection improvements are identified in Figure 3.14-2 and Figure 3.14-3.

The Project would result in short-term increases in traffic levels due to the daily movement of construction workers to and from the Project site, as well as daily material and equipment deliveries. Changes in traffic volumes as a result of Project construction are shown in **Table 4.14-4**.

Table 4.14-4: Project Construction Traffic Summary

Road	Estimated[a] Existing AADT or ADT (2023/2024)	Existing Peak Hour Traffic	Peak Construction Daily Worker Traffic[b]	Peak Construction Daily Truck Traffic[c]	Total ADT during Peak Construction	Percentage of Truck Increase	Construction Peak Hour Traffic
I-82	22,947[e]	2,295	748	498	24,193	15%	2,607
State Route 397	2,269[e]	227	1,196	498	3,963	12%	453
State Route 221	2,985[e]	299	688	120	3,793	0%	539
Bofer Canyon Road[d]	286[f]	29	1,496	498	2,280	22%	341
Nine Canyon Road	752[f]	75	598	498	1,998	25%	301
Locust Grove Road	432[f]	43	1,496	498	2,426	21%	355
Travis Road	710[f]	71	1,379	412	2,501	16%	356
Plymouth Road	787[f]	79	1,376	412	2,575	16%	364
Sellards Road	851[f]	85	1,376	412	2,639	16%	370
Badger Canyon Road	412[f]	41	1,376	0	1,788	0%	316

Source: Horse Heaven Wind Farm, LLC 2021

Notes:

(a) The annual growth rate used in the forecast was approximately 3 percent for all roads (Horse Heaven Wind Farm, LLC 2021).

(b) Because worker housing locations are unknown, workers could come to the site via I-82, State Route 397, State Route 221, or Badger Canyon Road, and it is almost certain to be some combination of all of these; the total peak-hour worker vehicles are added to each of those routes to provide a conservative worker ADT value.

(c) This column's value is double the peak number of trucks for the phase that affects that road because each truck makes one trip in and one trip out. Additionally, all deliveries are anticipated to come from I-82, so some roads are not utilized. This is because some days a given road may have little to no truck traffic and other roads may see the given peak, which would not correspond to the peak workforce, but rather to that area of the Project being worked on during the peak period.

(d) This is an assumed number of vehicles used for analysis because data were not available for Bofer Canyon Road.

(e) Current AADT data for interstate routes are from the closest permanent traffic recorders used.

(f) Current ADT data for Benton County roads is from 2015 to 2016 (WSDOT 2016).

AADT = average annual daily traffic; ADT = average daily traffic; I-82 = Interstate 82

Table 4.14-4 assumes that most workers would not leave the site during the day; however, most would have to drive throughout the site during the day. As an example, a worker may drive on Plymouth Road commuting in the morning, then drive on the same road to the day's construction location, then back to the laydown yard on the same road before traveling on it a fourth time leaving for the day. In terms of ADT, this means that one worker was on four ADT trips on Plymouth Road. The actual value in the Peak Construction Daily Worker Traffic column is a representative estimate of this phenomenon that is difficult to accurately quantify. I-82 and State Route 221 are expected to only have the morning and evening commute, so two times the peak worker vehicle number was added by the Applicant. The rest of the roads would have inter-Project travel, so four times the peak worker vehicle number was used by the Applicant.

The Applicant's anticipated LOS during construction is shown in **Table 4.14-5** for highways and freeways and **Table 4.14-6** for intersections.

Table 4.14-5: Peak Construction Level of Service for Highway/Freeway

Highway/Freeway	Existing Density (pcpmpl)	Existing LOS	Forecast Peak Density (pcpmpl)	Forecast[a] LOS during Peak Construction
I-82	10.9	A	12.9	B
State Route 397	0.4	A	3.8	B
State Route 221	0.5	A	3.0	B

Source: Horse Heaven Wind Farm, LLC 2021
Notes:
[a] Forecasted by the Applicant an3d provided as Table 4.4-7 in the ASC (Horse Heaven Wind Farm, LLC 2021). LOS to be confirmed during the completion of the third-party traffic analysis.
A = free-flow; B= Reasonably free-flow; I-82 = Interstate 82; LOS = level of service; pcpmpl = passenger cars per mile per lane

Table 4.14-6: Peak Construction Level of Service for Intersections

Intersection	Existing Delay (s/veh)	Existing LOS	Forecast Delay during Peak Construction (s/veh)	Forecast[a] LOS during Peak Construction
Route 397 and S Nine Canyon Road	11.4	B	15.2	C
Bofer Canyon Road and Beck Road	8.8	A	17.0	C
I-82 N Ramp and Locust Grove Road	10.1	B	13.9	B
I-82 S Ramp and Locust Grove Road	11.5	B	12.7	B
Locust Grove Road and S Plymouth Road	8.8	A	10.5	C
Travis Road and Cemetery Road	9.3	A	12.2	B
Route 221 and Sellards Road	12.9	B	32.6	D

Source: Horse Heaven Wind Farm, LLC 2021
Notes:
[a] Forecasted by the Applicant and provided as Table 4.4-7 in the ASC (Horse Heaven Wind Farm, LLC 2021). LOS to be confirmed during the completion of the third-party traffic analysis.
A = free-flow; B= Reasonably free-flow; C= Stable flow; D= Approaching unstable flow; I-82 = Interstate 82; LOS = level of service; s/veh = seconds per vehicle

The ASC assumes that the peak hour for existing traffic is the same as the peak hour for the Project worker traffic so that the analyzed condition is conservative. The comparative analysis considers the peak workforce for construction for the same reason.

Interstate 82

Most Project construction traffic may travel on I-82. At the time of construction, the ADT is estimated to be 22,947 trips. Most, if not all, materials and equipment deliveries are anticipated to come from the south on I-82, while most workers who use I-82 would come from the north from Kennewick and the surrounding area. It is assumed that during peak-hour peak construction, the LOS would remain well below capacity and well within the LOS standard, potentially decreasing from an existing LOS of A to an LOS of B. Interstate highways are constructed to handle legal size and weight loads, and the condition of I-82 would not be adversely affected by transport of the loads required for Project construction.

State Route 397

The segment of State Route 397 just east of I-82 to the turn at Nine Canyon Road would carry most of the traffic for the easternmost Project components. State Route 397 is unlikely to see significant traffic during the peak hour of construction because peak-hour traffic would turn immediately onto Bofer Canyon Road from State Route 397 after exiting I-82 to access the laydown area. Project construction may add as many as 226 vehicles to this intersection during its peak hour as analyzed. This is an approximately 100 percent increase in peak-hour traffic and almost 17.5 times the current ADT during peak construction. This number of additional trips for construction would not cause significant change on the roadway; however, at the intersections of State Route 397 and Bofer Canyon Road, as well as State Route 397 and Nine Canyon Road, it is expected that the increased traffic would cause a decrease to LOS C, which is within the minimum standard of D specified for this particular highway segment.

State Route 221

The segment of State Route 221 immediately south of I-82 and just east of the city of Prosser would be used for solar and western substation construction traffic. State Route 221 provides the most direct access to potential laydown yard locations in the west. The traffic counts on State Route 221 are estimated to be 2,985 in 2024 (**Table 4.14-4**). Project construction would add an estimated 240 peak-hour trips and as many as 808 more ADT trips on this road segment. This is an approximately 90 percent increase in peak hour or 30 percent increase in ADT on this highway. The number of additional trips for construction is not anticipated to cause significant change to LOS on the roadway. However, the intersections of State Route 221 and Sellards Road, and State Route 221 and County Well Road, would have a significant decrease in LOS. It is assumed that the intersection would temporarily operate at LOS D during peak construction hours, which is below the County’s LOS standard of C.

Due to the currently low ADT level, Project traffic would increase the road’s usage by many times the current ADT, resulting in a decrease in LOS during peak construction. The peak-construction period is temporary. Impacts would be noticed primarily at intersections because that is where the delays and conflicting vehicular interactions would occur. It is likely that all the local gravel roads would be improved to accommodate the heavy vehicle traffic, and the improved condition would remain even after construction, resulting in a high probability of improved ride quality and road surface condition. A maintenance agreement with Benton County would be developed for the paved roads to repair any damage caused by construction.

The main concern for State Route 221 is its current deteriorated pavement condition. A large number of heavy loads is likely to cause issues on roads that are nearing or past their design lives. It cannot be stated conclusively whether the Project would cause substantial deterioration of a poor condition road; however, the deterioration may need to be addressed as part of the Project's road improvement effort. As discussed in the ASC, a detailed condition assessment would be conducted prior to construction to ensure that any condition improvements needed prior to construction are conducted and that the roads are restored to their original condition or better when construction is complete.

Local Gravel Roads

The gravel roads throughout the area are likely to be improved as part of the construction of the Project and would therefore continue to facilitate the circulation of local traffic. Thus, during construction, only occasional short delays would be experienced during the improvement of roads. Preconstruction improvements and condition assessments for all roads would be addressed through a maintenance agreement.

Turbine Option 1

Additional impacts are likely due to the delivery of large components. The delays caused by slow-moving large components are not quantifiable; however, the navigation, particularly of turbine blades, throughout the area is expected to cause occasional delays and obstructions while turning. Temporary road modifications would be required to accommodate the large-component turning radii at designated locations. Up to 275 truck trips per day would be generated by public road intersection improvements, access road, substation, O&M facilities, transmission line, and turbine construction activities during the 22-month construction timeframe for the combination of Phase 1 and Phase 2b, resulting in an estimated total of 68,621 truck trips. Construction equipment that moves on a day-by-day basis, such as cranes and derricks that would be used for the construction of the proposed towers, could pose a hazard to aviation safety for non-commercial aircraft during the construction period.

Impacts from turbine construction under Turbine Option 1 that may affect transportation would be medium in magnitude due to the increased possibility of incidents during the improvements to roadways that could be required for the transportation of turbines and potential impacts on access to public facilities such as recreation resources. Impacts would be short term in duration due to the impacts occurring during the construction stage. Impacts would be unavoidable due to the size of the turbines, required road improvements, and the amount of truck trips required for transport. Impacts from the transportation of the heavy and wide loads could occur outside of the Lease Boundary past neighboring receptors, indicating a regional spatial extent.

Turbine Option 2

Impacts on transportation during construction of turbines under Turbine Option 2 would be similar to those described for construction under Turbine Option 1. Impacts from turbine construction under Turbine Option 2 that may affect transportation would be medium in magnitude due to the increased potential for incidents during the potential improvements to roadways required for the transportation of turbines and short term in duration due to the impacts occurring during the entire construction stage. Impacts would be unavoidable due to the size of the turbines, required road improvements, and the amount of truck trips required for transport. Impacts from the transportation of the heavy and wide loads could occur outside of the Lease Boundary past neighboring receptors, indicating a regional spatial extent.

Solar Arrays

The transportation of solar arrays throughout the area is expected to cause occasional delays and obstructions while the trucks are turning. Approximately 152 truck trips per day would be generated by solar array construction, resulting in an estimated 40,023 truck trips.

Impacts would be medium in magnitude due to the increase in traffic, short term in duration, unavoidable, and local in spatial extent due to neighboring receptors seeing a decrease in LOS, but interstates are believed to be able to handle the increase in traffic.

Battery Energy Storage Systems

The transportation of BESS components throughout the area is expected to cause occasional delays and obstructions while trucks are turning. Approximately 21 truck trips per day would occur for the construction of the three BESSs, resulting in a total of 5,322 truck trips.

Impacts would be low in magnitude, temporary in duration, probable during the transportation of BESS-related components, and local in spatial extent.

Substations

Impacts during the construction of the substations could occur due to the delivery of large components. The transportation of substations throughout the area could cause occasional delays and obstructions while trucks are turning.

Impacts would be low in magnitude due to the minor increase in traffic, temporary in duration due to the short time expected to transport the materials required to construct the substations, probable during the transport of substation-related components, and local in spatial extent.

Comprehensive Project

It is assumed that construction of the transmission lines would occur concurrently with the wind farm, solar, and BESS construction so that the combined average daily trips during the 21 to 22 months when all activities are underway would be approximately 365 truck trips per day. Because construction material and equipment traffic is not uniform, this number is increased by 25 percent to estimate peak periods, yielding an estimated maximum of 457 truck trips per day during peak construction. There is the potential for the intersection of Bofer Canyon Road and State Route 397 to fall below the acceptable LOS standard during the peak hours of construction. Applicant-committed measures would be implemented to reduce the level of impact. For these reasons, the Project would be consistent with the transportation element of the Benton County Comprehensive Plan.

During Project construction, many construction vehicles, including trucks with oversized and overweight loads, would need to share the existing roadway network with the general public. As a result, some accidents could occur that would be directly attributable to construction traffic. Emergency vehicles may experience delays responding to emergencies if public roads are partially or completely closed. During construction, fuels and waste products would be transported to and from the Project by a licensed specialized tanker vehicle on an as-needed basis. Spill prevention during construction would include preventive procedures to avoid spills during transportation and the requirement of a Spill Prevention Control and Countermeasures Plan, to be developed by the construction contractor.

The ASC analyzed impacts closest to the Lease Boundary and did not address areas at further distances. Considering the amount of Project-related truck and worker commute traffic, there could be a medium magnitude impact on the public’s access to recreational facilities and private residences within 3 miles of the Lease Boundary, a low magnitude impact on areas within 3 to 6.5 miles of the Lease Boundary, and a negligible magnitude impact on the public’s access to facilities past 6.5 miles. A high magnitude impact on access is not expected. Farming equipment may experience traffic delays along roadways due to the construction required for road modifications, transportation of oversized loads, and the increase in commuter traffic. Recreationists using facilities that utilize the same access roads as the Project may experience delays during the construction stage, and impacts are further analyzed in Section 4.12.

Impacts from the combined construction of the Project would be medium in magnitude, short term due to the potential for impacts to occur during the entire construction stage, unavoidable, and regional in spatial extent.

4.14.2.2 Impacts during Operation

The ASC did not provide information that would allow separate analysis of the operation of Turbine Option 1, Turbine Option 2, substations, and BESSs. Once operational, expected traffic volumes during normal operation of the Project would be up to 16 to 20 vehicle trips per day to and from the O&M facilities by O&M staff. O&M staff would commute to the Project during normal peak commuting hours. It is assumed that O&M staff would reside in the Tri-Cities or nearby communities and use the same roads that would be used by the workforce during construction of the Project; operational traffic generation would be minimal. O&M staff would perform scheduled preventive maintenance on the turbines, solar module, and battery storage facilities. O&M staff would drive throughout the Project on a regular basis conducting unrecorded visual inspections of the Project. Truck traffic would be minimal; heavy equipment may be brought in occasionally for major repairs or turbine replacement, but these occasions are expected to be infrequent.

Additional trips may occur in the form of delivery vehicles (e.g., FedEx/UPS) used to deliver small packages to the site; however, these deliveries would be infrequent. It is anticipated that O&M staff would drive light-duty trucks, water trucks, and utility vehicles kept at the O&M facilities (not driven off site) to conduct maintenance.

Routine maintenance, and repair or replacement, of Project components are expected to occur. Although routine maintenance could be expected every six months, replacement of larger parts would occur infrequently (EPA 2013). Impacts on traffic during maintenance activities for larger parts would be low due to the few events expected to occur, temporary and only occurring during events, unavoidable due to required maintenance, and local.

Solar Arrays

The solar panels would be routinely cleaned during operations. Water would be carried via 4,000-gallon trucks for about 168 trucks per cleaning event. This would probably take place over approximately one week every year. The anticipated number of 35 trucks per day over one week, three times per year, that would be used for the cleaning is substantially less than those used during peak construction and would not result in a significant impact on local roads or traffic conditions.

Impacts from the operation of solar arrays would be low in magnitude, temporary during the cleaning of the solar arrays, probable due to the minor increase of traffic, and local in extent.

Comprehensive Project

During operation, it is expected that traffic conditions similar to those listed under existing conditions would continue to exist. The Project would add 16 to 20 vehicle trips per day to the O&M facilities by O&M staff, with an additional 35 trips per day during periods of panel washing.

Traffic hazards would be minimized by following the U.S. Department of Transportation Pipeline and Hazardous Material Administration regulations related to the shipment of lithium-ion batteries, and following the commitments outlined in Section 4.3.3 of the ASC.

Because there would be minimal O&M staff activity, minimal impacts on traffic and on transportation infrastructure are expected. The Applicant would maintain new access roads during operations. Given the minimal vehicular traffic during Project operations, and as Project facilities would not displace or impede transportation networks, no change is expected to the current movement or circulation of people or goods during operation of the Project. Multipurpose use of existing rights-of-way on existing roads would be maintained during operation of the Project. No multipurpose use of new permanent Project access roads would occur, as private Project access roads would not be open to the public.

Impacts on transportation from the Project operations would be low in magnitude; long term during the life of the Project; probable, due to solar panel washing; and local in spatial extent.

4.14.2.3 Impacts during Decommissioning

After dismantling the facility, high-value components would be removed for scrap value. The remaining materials would be reduced to transportable size and removed from the site for disposal. Unsalvageable materials would be disposed of at authorized sites in accordance with applicable regulations. Prior to decommissioning, the Applicant would consult with WSDOT and Benton County on the development of a decommissioning-stage Traffic and Safety Management Plan that may include an updated traffic analysis.

Turbine Option 1

The disassembly and removal of turbines would essentially be the same as their installation, but in reverse order. Turbine tower portions and blades would be sized on site for transport by regular-sized haul trucks (no oversize permits or specialized equipment needed).

Impacts on transportation during decommissioning of turbines under Turbine Option 1 would be low in magnitude due to components being sized appropriately for transport and not requiring oversize permits, short term in duration, unavoidable, and regional in spatial extent due to the dismantled material having to be transported outside of the Lease Boundary and past neighboring receptors, potentially on other rural roads not near the Lease Boundary.

Turbine Option 2

Impacts on transportation during decommissioning of turbines under Turbine Option 2 would be similar to those described for construction under Turbine Option 2. Impacts would be low in magnitude due to components being sized appropriately for transport and not requiring oversize permits, short term in duration, unavoidable, and regional in spatial extent due to the dismantled material having to be transported outside of the Lease Boundary and past neighboring receptors, potentially on other rural roads not near the Lease Boundary.

Solar Arrays

Solar photovoltaic modules used for the Project would be dismantled and packaged per manufacturer or approved recycler specifications and shipped to an approved off-site recycler. Impacts on transportation during decommissioning of solar arrays would be similar to those described for the construction of solar arrays. Impacts would be low in magnitude, short term in duration, unavoidable, and local in spatial extent due to the increase in traffic having an impact on rural roads near the Lease Boundary.

Battery Energy Storage Systems

Batteries would be recycled if feasible and otherwise transported to an approved disposal facility. Impacts on transportation during decommissioning of BESSs would be similar to those described for the construction BESSs. Impacts would be low in magnitude, temporary in duration, probable, and local in spatial extent.

Substations

All aboveground structures associated with the substations, including the conductors, switches, transformers, fencing, and other components, would be dismantled and removed from the site. Impacts on transportation during decommissioning of substations would be similar to those described for the construction of substations. Impacts would be low in magnitude, temporary in duration, probable, and local in spatial extent.

Comprehensive Project

Impacts on transportation during decommissioning of the Project would be similar to those described for the construction of the Project. Impacts would be low in magnitude, short term in duration, unavoidable, and regional in spatial extent.

4.14.2.4 Applicant Commitments and Identified Mitigation

This section describes the measures that would reduce or compensate for impacts related to traffic from construction, operation, and decommissioning of the Project. These measures would be implemented in addition to compliance with the environmental permits, plans, and authorizations required for the Proposed Action.

Applicant Commitments

The Applicant has identified measures and/or best practices that are designed to prevent or minimize potential impacts on the affected environment for the Project. Measures presented by the Applicant in the ASC (Horse Heaven Wind Farm, LLC 2021), and taken into consideration in the characterization of potential impacts on traffic are discussed in Section 2.3 and summarized below.

- All road improvement and construction would be performed in conjunction with Benton County Public Works requirements following Benton County Standards. The Applicant would maintain new access roads to access the turbine structures during operations.
- Prior to commencement of construction, the Applicant would consult with WSDOT and Benton County on the development of a construction-stage Traffic and Safety Management Plan.
- The Applicant would obtain all necessary WSDOT permits to access, modify ingress and egress for, or transport regulated loads on state-managed roadways.
- The Applicant would obtain WSDOT trip permits for oversized and overweight loads.
- When slow or oversized wide loads are being hauled, appropriate vehicle and roadside signing and warning devices would be deployed. Pilot cars would be used as WSDOT dictates, depending on load size and weight.
- A detailed haul plan would be developed once turbines have been selected and the construction schedule developed. This haul plan would confirm source locations and routes to be used during Project construction, as well as anticipated loads and haul schedule.

- The Transportation Study provided as Appendix V of the ASC would be verified and updated to include detailed condition assessments of roads to be used, structural assessments, and plans for improvement and maintenance.
- Ingress and egress points would be located and improved (if needed) to ensure adequate capacity for existing and projected traffic volumes and to provide efficient movement of traffic, including existing and anticipated agricultural traffic.
- The Applicant would coordinate with EFSEC and Benton County, to identify a qualified third-party engineer who would document road conditions prior to construction and again within 30 days after construction is complete or as weather permits.
- A service agreement between the Applicant and Benton County would ensure post-construction road restoration to conditions as good or better than preconstruction.
- The Applicant or its contractor and EFSEC staff would meet prior to final site plan approval to outline steps for minimizing construction traffic impacts, including conflicts if state-imposed roadway restrictions could affect transporter routes.
- The Applicant or its contractor would provide advance notification to adjacent landowners and farmers through mailing, informal meeting, open house, or other similar methods when construction would take place in the vicinity of their homes and farms to help minimize access disruptions.
- All construction vehicles would yield to school-related vehicles (e.g., school buses) and would lower their speed when approaching a school bus or bus stop along the transporter route.
- Advanced warning and proper roadway signage would be placed on major state and Benton County roads to warn motorists of potential Project-related vehicles entering and exiting the roadway.
- Carpooling among the construction workers would be encouraged to reduce traffic volume to and from the Project site.
- Detour plans and warning signage would be provided in advance of any planned traffic disturbances.
- Flaggers would be employed as necessary to direct traffic when large equipment is exiting or entering public roads to minimize the risk of accidents. Should the Applicant or its construction contractor receive notice during Project construction of transportation events (e.g., WSDOT or Benton County transportation projects, roadway incidents, other traffic events) that give rise to a safety concern, the Project construction manager would review the Traffic and Safety Management Plan in coordination with the applicable agency and address additional safety measures, including flagging, as may be appropriate for the situation.
- If lane closure must occur, adequate signage for potential detours or possible delays would be posted.
- Advance notification would be provided to emergency providers and hospitals when public roads may be partially or completely closed.
- Emergency vehicles would be given the right-of-way as required by local, state, and federal requirements.
- Site access roads and an entrance driveway to the O&M facilities on site would be constructed to service truck movements of legal weight and provide adequate sight distance.

- Traffic control requests would be coordinated through the WSDOT traffic engineer and the Benton County Public Works Department abiding by seasonal County road restrictions.
- A haul and approach route would be developed in coordination with the appropriate jurisdictional authorities.
- Permanent private Project access roads would be maintained by the Applicant for the life of the Project.
- Tracked vehicles and heavy trucks would be restricted to approved transporter roads to prevent damage to the surface and base of Benton County roads.
- Turbines and permanent meteorological towers would be lit according to FAA regulations.
- The Applicant would obtain Determinations of No Hazard to Air Navigation from the FAA.
- Advanced warning and proper roadway signage would be placed on highways and Benton County roads to warn motorists of potential vehicles entering and exiting the roadway.
- After construction, all-weather access roads (including graveled roads), suitable to handle emergency equipment, would be provided to within 150 feet of any built structure or surface activity area.

Recommended Mitigation Measures

EFSEC has identified the following additional and modified mitigation measures that could be required by EFSEC, but may also involve the participation of other parties, for the Project to avoid and/or minimize potential impacts on transportation. EFSEC would work with the identified parties to facilitate cooperation in implementing this mitigation measure:

TR-1[36]: To ensure safe practices during the transportation of materials during construction and decommissioning, the load movement team would review the procedures to be followed if the load should become lodged at a crossing and would review the emergency contact numbers for each crossing daily—that is, before starting travel for the day.

TR-2: To mitigate potential collisions at train crossings, the Applicant would work with WSDOT and Operation Lifesaver to provide train safety presentations to employees and contractors to increase knowledge regarding train safety, including train track crossings. Since this measure cannot be required by EFSEC, it cannot be considered fully effective mitigation for the purpose of this analysis.

TR-3: To ensure that no changes have occurred since the traffic analysis originally provided prior to construction, a third-party engineer would provide a traffic analysis prior to decommissioning. The traffic analysis would evaluate all modes of transportation (e.g., waterways, rail, roads, etc.) used for the movement of people and materials during decommissioning via the haul route(s) in Washington State.

TR-4: To ensure that no changes have occurred since the route survey originally provided prior to construction, all railroad crossing and grade changes would be included in a route survey performed by a third-party engineer with the Washington Utilities and Transportation Commission participating to determine if current traffic control systems at crossings are appropriate or if additional mitigation is needed prior to decommissioning. The route survey would include anticipated traffic counts. Since this measure would

[36] TR-: Identifier of numbered mitigation item for Transportation

require the participation of other agencies to be implemented, it cannot be considered fully effective mitigation for the purpose of this analysis.

TR-5: The analysis of impacts from decommissioning is based on existing laws and regulations at the time when the ASC was submitted to EFSEC. To ensure that no changes have occurred to laws and regulations used in this analysis, the Applicant would consult with WSDOT and Benton County on the development of a decommissioning-stage Traffic and Safety Management Plan, prior to decommissioning. The Traffic and Safety Management Plan must include a safety analysis of the WSDOT-controlled intersections (in conformance with the WSDOT Safety Analysis Guide) and recommend mitigation or countermeasures where appropriate. The analysis would review impacts from decommissioning traffic and be submitted to WSDOT for review and comment prior to decommissioning activities. Since this measure would require the participation of other agencies to be implemented, it cannot be considered fully effective mitigation for the purpose of this analysis. EFSEC would work with the identified agencies to facilitate cooperation in implementing this mitigation measure.

4.14.2.5 Significant Unavoidable Adverse Impacts

Determining the significance of an impact involves context and intensity, which, in turn depend on the magnitude and duration of an impact. “Significant” in the Washington State Environmental Policy Act means a reasonable likelihood of more than a moderate adverse impact on environmental quality. An impact may also be significant if its chance of occurrence is not great, but the resulting environmental impact would be severe if it occurred (WAC 197-11-794).

This Draft EIS weighs the potential impacts on transportation that may result from the Proposed Action with mitigation and makes a resulting determination of significance for each impact in **Tables 4.14-7a, 4.14-7b, and 4.14-7c**.

This Page Intentionally Left Blank

Table 4.14-7a: Summary of Potential Impacts on Transportation during Construction of the Proposed Action

Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact: ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact: ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact: ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact: ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Vehicular Traffic	Turbine Option 1 Turbine Option 2 **Comprehensive Project**	Traffic volumes would increase measurably during transportation of material and equipment for the construction of the turbines. The potential for traffic volumes and slower, oversized roads would likely decrease level of service for intersections near the Lease Boundary and highways/ freeways. The increase in traffic volumes and the size of construction material may decrease roadway safety at intersections near the Project or on railroad crossings.	Medium	Short Term	Unavoidable	Regional	**TR-1:** Daily transport communication, including emergency numbers **TR-2:** Operation Lifesaver safety presentation and training	None identified
Vehicular Traffic	Solar Arrays	Traffic volumes would increase measurably during transportation of material and equipment during the construction of the solar arrays and would likely decrease level of service for intersections near the Lease Boundary. The increase in traffic volumes may decrease roadway safety at intersections near the Project or on railroad crossings.	Medium	Short Term	Unavoidable	Local	**TR-1:** Daily transport communication, including emergency numbers **TR-2:** Operation Lifesaver safety presentation and training	None identified
Vehicular Traffic	BESSs Substations	Traffic volumes may increase, but a decrease in level of service is not expected, nor is there the potential for roadway safety to decrease.	Low	Temporary	Probable	Local	**TR-1:** Daily transport communication, including emergency numbers **TR-2:** Operation Lifesaver safety presentation and training	None identified

Notes:

(a) The impacts related to each component, including “comprehensive Project,” were rated separately; components were combined in the same cell if they received the same impact ratings for the identified topic.

(b) Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.

(c) Mitigation measures listed here are additional actions that EFSEC could impose to further reduce the impacts. See Section 4.1 Introduction for details.

(d) Significant unavoidable impacts are those that would remain even after all identified additional mitigation measures have been required by EFSEC.

BESS = battery energy storage system; EFSEC = Washington Energy Facility Site Evaluation Council; EIS = Environmental Impact Statement

Table 4.14-7b: Summary of Potential Impacts on Transportation during Operation of the Proposed Action

Topic	**Component[(a)]**	**Description of Impact[(b)]**	**Magnitude of Impact:** ▪ Negligible ▪ Low ▪ Medium ▪ High	**Duration of Impact:** ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	**Likelihood of Impact:** ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	**Spatial Extent or Setting of Impact:** ▪ Limited ▪ Confined ▪ Local ▪ Regional	**Mitigation[(c)]**	**Significant Unavoidable Adverse Impacts[(d)]**
Vehicular Traffic	Turbine Option 1 Turbine Option 2 BESSs Substations	Maintenance of facilities would include preventive and expected maintenance throughout the operation of the Project.	Low	Temporary	Unavoidable	Local	No mitigation identified	None identified
Vehicular Traffic	Solar Arrays **Comprehensive Project**	Operation of the solar arrays may require water trucks to deliver wash water to clean the panels. A decrease in level of service is not expected, nor is roadway safety expected to decrease.	Low	Long Term	Probable	Local	**TR-2:** Operation Lifesaver safety presentation and training	None identified

Notes:
[(a)] The impacts related to each component, including “comprehensive Project,” were rated separately; components were combined in the same cell if they received the same impact ratings for the identified topic.
[(b)] Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.
[(c)] Mitigation measures listed here are additional actions that EFSEC could impose to further reduce the impacts. See Section 4.1 Introduction for details.
[(d)] Significant unavoidable impacts are those that would remain even after all identified additional mitigation measures have been required by EFSEC.
BESS = battery energy storage system; EFSEC = Washington Energy Facility Site Evaluation Council; N/A = Not enough information to provide a separate analysis.

Table 4.14-7c: Summary of Potential Impacts on Transportation during Decommissioning of the Proposed Action

Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact: ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact: ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact: ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact: ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Vehicular Traffic	Turbine Option 1 Turbine Option 2 **Comprehensive Project**	Decommissioning will require the removal and transportation of the dismantled pieces of the turbines, expected to be smaller than the pieces that arrived during the construction stage. The increase in traffic volumes is not expected to decrease level of service or cause a decline in roadway safety.	Low	Short Term	Unavoidable	Regional	**TR-1:** Daily transport communication, including emergency numbers **TR-2:** Operation Lifesaver safety presentation and training **TR-3:** Traffic Analysis **TR-4:** Railroad crossing and grade change survey **TR-5:** Traffic and Safety Management Plan	None identified
Vehicular Traffic	Solar Arrays	Decommissioning will require the removal and transportation of the solar arrays and supporting infrastructure. The increase in traffic volumes is not expected to decrease level of service or cause a decline in roadway safety.	Low	Short Term	Unavoidable	Local	**TR-1:** Daily transport communication, including emergency numbers **TR-2:** Operation Lifesaver safety presentation and training **TR-3:** Traffic Analysis **TR-4:** Railroad crossing and grade change survey **TR-5:** Traffic and Safety Management Plan	None identified
Vehicular Traffic	BESSs Substations	Decommissioning will require the removal and transportation of the BESSs and substations. The increase in traffic volumes is not expected to decrease level of service or cause a decline in roadway safety.	Low	Short Term	Probable	Local	**TR-1:** Daily transport communication, including emergency numbers **TR-2:** Operation Lifesaver safety presentation and training **TR-3:** Traffic Analysis **TR-4:** Railroad crossing and grade change survey **TR-5:** Traffic and Safety Management Plan	None identified

Notes:
(a) The impacts related to each component, including “comprehensive Project,” were rated separately; components were combined in the same cell if they received the same impact ratings for the identified topic.
(b) Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.
(c) Mitigation measures listed here are additional actions that EFSEC could impose to further reduce the impacts. See Section 4.1 Introduction for details.
(d) Significant unavoidable impacts are those that would remain even after all identified additional mitigation measures have been required by EFSEC.
BESS = battery energy storage system; EFSEC = Washington Energy Facility Site Evaluation Council

4.14.3 Impacts of No Action Alternative

Under the No Action Alternative, impacts related to transportation from the construction, operation, and decommissioning of the Proposed Action would not occur. For the purpose of this analysis, it is assumed that no future development would occur within the Lease Boundary.

This Page Intentionally Left Blank

4.15 Public Services and Utilities

This section describes potential impacts on public services and utilities from the proposed Horse Heaven Wind Farm (Project, or Proposed Action) or under the No Action Alternative. Public services such as law enforcement, fire protection, emergency management services, and hospitals are evaluated in Section 4.13, Public Health and Safety. Similarly, schools are evaluated as part of Section 4.16, Socioeconomics. Utilities providing public services within the vicinity of the Lease Boundary are identified in Section 3.15. Washington Administrative Code (WAC) 463-60-535(4) requires a review of a proposed facility's impact on utilities.

Section 4.4, Water Resources, evaluates the collection and conveyance of stormwater within the Lease Boundary and Project vicinity. Section 4.7, Energy and Natural Resources, evaluates the supply and demand for electricity and water within the Project vicinity, Benton County, and the State of Washington. Section 4.14, Transportation, evaluates the Project's impact on streets both locally and regionally. Section 4.13, Public Health and Safety, evaluates the Project's impact on law enforcement and emergency response agencies. The qualitative evaluation presented herein relies on the impact scale defined in Section 4.1 and summarized in **Table 4.15-1**.

Table 4.15-1: Impact Rating Table for Public Services and Utilities from Section 4.1

Factor	Rating →			
Magnitude	**Negligible** indistinguishable from the background	**Low** small impact, non-sensitive receptor(s)	**Medium** intermediate impact, may occur on sensitive receptor(s) or affect public health and safety	**High** large impact on sensitive receptor(s) or public health and safety
Duration	**Temporary** infrequently during any stage	**Short Term** duration of construction or site restoration	**Long Term** during operation or operation plus another stage of Project	**Constant** during life of Project and/or beyond the Project
Likelihood	**Unlikely** not expected to occur	**Feasible** may occur	**Probable** expected to occur	**Unavoidable** inevitable
Spatial Extent/Setting	**Limited** small area of Lease Boundary or beyond Lease Boundary if duration is temporary	**Confined** within Lease Boundary	**Local** beyond Lease Boundary to neighboring receptors	**Regional** beyond neighboring receptors

Table 4.15-2 describes the intended framework for using the magnitude rankings in the evaluation of impacts on public services and utilities.

Table 4.15-2: Criteria for Assessing Magnitude of Impacts on Public Services and Utilities

Magnitude of Impacts	Description
Negligible	**Level of Service**: Changes in the level of service would be either non-detectable or, if detected, would have no noticeable impact on a public utility's ability to serve its community or customers. **Safety**: The reduction in the level of service would not alter existing risks to human health.
Low	**Level of Service**: Changes in the level of service would be measurable, but the changes would be small and localized and would not inhibit a public utility's ability to serve its community or customers. **Safety**: The reduction in the level of service would not alter the existing risk to human health or community cohesion.
Medium	**Level of Service**: Changes in the level of service would be measurable and would interrupt the public's use of the utility and resource. **Safety**: The reduction in the level of service would increase risks to human health; however, fatalities would not be expected to occur and community cohesion would remain unchanged.
High	**Level of Service**: Changes in resource availability would be readily measurable and would have substantial consequences on local or regional populations. **Safety**: The reduction in the level of service would cause an increased risk to human health that could result in fatality, and a breakdown of community cohesion would be noticeable.

4.15.1 Method of Analysis

For this discussion, the Project's impact on public services and utilities is evaluated through an analysis of sewage and solid waste collection and treatment. Horse Heaven Wind Farm, LLC's (Applicant) Application for Site Certification (ASC) presents information on potential waste streams and disposal options for the Project's construction, operations, and decommissioning stages. An adverse impact on sewage and solid waste management would occur if the Project would cause one of the following scenarios:

- Violation of an existing regulation
- Decrease in the existing level of service provided by a utility
- Decrease in the capacity of a utility to service its community

Planning Analysis

A consistency determination summarizes whether a proposed action would be undertaken in a manner that is consistent with enforceable policies of a government-approved management program. **Table 4.15-3** presents a comparison of the Project and the relevant goals and policies of the Benton County Comprehensive Plan's utilities element (UE) and the 2013 Update Benton County Solid Waste and Moderate Risk Waste Plan (referred to herein as the Benton County Plans) (Benton County 2014, 2021).

Table 4.15-3: Comparison of the Project with Benton County Plans

Applicable Plan	Goal/Policy	Analysis
Benton County Comprehensive Plan	**UE Goal 1**: Ensure utilities support the land use and economic development goals of the County	It is anticipated that the Project would be consistent with UE Goal 1 as it is in alignment with the following Benton County land use and economic development goals: ▪ Land Use Goal 5: Identify the location, site planning, and density of new non-farm development outside of UGAs to protect existing agriculture from incompatible adjacent land uses. ▪ Land Use Goal 5 Policy 1: Establish compatible land uses adjacent to areas designated as GMA Agriculture to minimize conflicts associated with farm activities such as spray, dust, noise, odors, and liability. ▪ Economic Development Goal 2: Expand employment opportunities in unincorporated Benton County.
Benton County Comprehensive Plan	**UE Goal 2**: Maintain public and private household water and sewer systems that are consistent with the rural character of the County	It is anticipated that the Project would be consistent with UE Goal 2 as wastewater from the Project's O&M facilities would be discharged to an on-site septic system. The Benton-Franklin Health District is responsible for permitting, overseeing the design and installation of, and inspecting septic systems with wastewater flows less than 3,500 gallons per day. For wastewater flows more than 3,500 gallons, the Applicant would have to obtain approval from the Washington State Department of Health.
Benton County Comprehensive Plan	**UE Goal 3**: Facilitate efficiency in utility land use and development	It is anticipated that the Project would be consistent with UE Goal 3 as most of the proposed transmission line route occurs on private property, where ongoing agricultural activity would occur along the corridors. Proposed transmission lines would be located adjacent and parallel to existing public road right-of-way where possible. The Project's transmission line corridor would accommodate multiple land uses, including utilities and agricultural uses. The eastern Project substation would be located adjacent to the BPA proposed Bofer Canyon substation, thereby eliminating the need for new transmission lines at this location.
Benton County Comprehensive Plan	**UE Goal 3 Policy 2**: Encourage multiple uses, including passive recreational use, in utility corridors where practical	It is anticipated that the Project would be consistent with UE Goal 3 Policy 2 as passive recreational uses within the proposed transmission line corridor would be possible on DNR land where practical. Additionally, the right-of-way for the transmission line would not be fenced.
Benton County Comprehensive Plan	**UE Goal 3 Policy 3**: Facilitate maintenance and rehabilitation of existing utility systems and facilities and encourage the use of existing transmission/distribution corridors	It is anticipated that the Project would be consistent with UE Goal 3 Policy 3 as the eastern Project substation has been located adjacent to BPA's proposed Bofer Canyon substation, thereby eliminating the need for new transmission lines at this location. Proposed transmission lines would be located adjacent to and parallel existing public road right-of-way where possible.

Table 4.15-3: Comparison of the Project with Benton County Plans

Applicable Plan	Goal/Policy	Analysis
2013 Benton County Solid Waste and Moderate Risk Waste Plan	**Goal #2**: Continue developing solid waste programs and projects that promote and maintain a high level of public health and safety which protects the human and natural environment of Benton County	It is anticipated that the Project would be consistent with Goal 2 as the Applicant's ASC states that any oily waste, rags, or dirty or hazardous solid waste would be collected in sealable drums at the construction yards, to be removed for recycling or disposal by a licensed contractor. During operation, there would be no substantial quantities of fuels, oils, or chemicals on site, except as contained in qualified oil-filled equipment, including the turbine gearboxes, substation transformers, and inverter station transformers within the solar array, and the sulfuric acid contained in the lead-acid batteries.
2013 Benton County Solid Waste and Moderate Risk Waste Plan	**Goal #3**: Manage solid wastes in a manner that promotes, in order of priority: waste reduction, reuse, and recycling, with source separation of recyclables as the preferred method	It is anticipated that the Project would be consistent with Goal #3 as the Applicant's ASC states that operation and maintenance of the Project is expected to generate approximately one or two dumpsters of waste per week at the O&M facilities. All waste would be stored within designated temporary waste collection areas until it is collected for transport to an approved landfill. Materials that can be recycled would be stored and transported separately.

Sources: Benton County 2014, 2021; Horse Heaven Wind Farm, LLC 2021
Applicant = Horse Heaven Wind Farm, LLC; ASC = Application for Site Certification; BPA = Bonneville Power Administration; DNR = Washington State Department of Natural Resources; GMA = Growth Management Act; O&M = Operations and Maintenance; UE = utilities element; UGA = urban growth area

Available Capacity

The Project's construction, operations, and decommissioning stages would increase demand for sewage treatment and solid waste disposal services in Benton County. **Table 4.15-4** shows the waste streams that would be generated within the Lease Boundary and Benton County's capacity to accommodate Project-generated increases in sewage and solid waste disposal.

4.15.2 Impacts of Proposed Action

This subsection evaluates potential impacts from the construction, operations, and decommissioning stages of the Project on sewage and solid waste treatment facilities and waste management plans. The discussion of direct impacts on sewage and solid waste treatment facilities focuses primarily on the service providers' ability to accommodate increased demand throughout the Project's lifecycle.

As noted in Section 3.15, several companies supply local, long-distance, and cellular telecommunications service in Benton County. Similarly, several companies provide television and internet services throughout the county. As a result of the abundance of available telecommunications options, it is anticipated that the Project would have no impact on the level of service provided to Benton County's homes and businesses.

Indirect impacts on the collection and treatment of sewage and solid waste are not anticipated because the Project is not expected to substantially induce regional growth (Horse Heaven Wind Farm, LLC 2021). For instance, the projected on-site workforce for the operations stage of the Project is expected to be 16 to 20 full-time employees.

Table 4.15-4: Summary of Waste Streams within the Lease Boundary

Waste Stream	Project Stage	Project Requirements	Disposal Capacity
Sewage and Wastewater	Construction	Construction workers would generate additional quantities of sewage from the use of temporary accommodations.	Sewage would be removed by a licensed hauler and disposed of at an existing municipal sewage treatment facility or otherwise disposed of in accordance with applicable state and local laws and regulations. For instance, of the multiple disposal options that exist within Benton and Franklin Counties, the Kennewick Wastewater Treatment Plant alone receives 5.35 million gallons per day of wastewater per day.
	Operations	Less than 5,000 gallons per day for kitchen and bathroom use.	Wastewater from the O&M facilities would be discharged to an on-site septic system.[a]
	Decommissioning	Construction workers would generate additional quantities of sewage from the use of temporary accommodations.	Sewage would be removed by a licensed hauler and disposed of at an existing municipal sewage treatment facility or otherwise disposed of in accordance with applicable state and local laws and regulations.
Industrial Wastewater	Construction and Operations	The Project would not generate industrial wastewater.	Not Applicable
Municipal Solid Waste (MSW)	Construction	The Project's construction would involve disposal of various quantities of non-hazardous construction wastes, including wood, concrete, plastics, metal, glass, insulation, and paper products.	Columbia Ridge Landfill has a permitted remaining capacity of approximately 329 million tons; Finley Buttes Landfill has an estimated available fill capacity of approximately 130 million tons of MSW.
	Operations	Operation and maintenance of the Project is expected to generate approximately one or two dumpsters of non-hazardous waste per week at the O&M facilities.	
	Decommissioning	Various quantities of non-hazardous construction wastes, including wood, concrete, plastics, metal, glass, insulation, and paper products.	

Table 4.15-4: Summary of Waste Streams within the Lease Boundary

Waste Stream	Project Stage	Project Requirements	Disposal Capacity
Energy Storage Batteries	Operations	Final design would determine the required number of lithium-ion batteries necessary to construct the facility's BESSs. Lithium-ion batteries have a typical lifespan of 5 to 10 years and will experience a gradual degradation of performance over that time.	
	Decommissioning	Based on the BESS design requirements.	

Sources: Clark County 2015; Waste Management 2019; Benton County 2021; Horse Heaven Wind Farm, LLC 2021

(a) Not[a)] The Application for Site Certification does not provide an exact amount that would be discharged to the on-site septic system but that it would be less than 5,000 gallons per day.

BESS = battery energy storage facility; MSW = municipal solid waste; O&M = operations and maintenance

4.15.2.1 Impacts during Construction

The temporary increase in population during construction would generate additional quantities of wastewater from the use of temporary accommodations. The ASC states that temporary portable sanitary facilities provided for construction crews would be adequate to support expected on-site personnel and would be removed at completion of construction activities. Wastewater generated in association with these facilities would be periodically removed by a licensed hauler and disposed of at an existing municipal sewage treatment facility or otherwise disposed of in accordance with applicable state and local laws and regulations (Horse Heaven Wind Farm, LLC 2021).

Project construction typically generates a variety of non-hazardous construction wastes, including wood, concrete, plastics, metal, glass, insulation, and paper products. Concrete that accumulates in the concrete washout area, along with any other material not suitable to be left in place, would be allowed to harden and then removed from the site. Additional construction wastes would include erosion control materials, such as straw bales and silt fencing, and electrical equipment.

Turbine Option 1

Construction activities under Turbine Option 1 would result in a low, short-term, unavoidable, local impact on wastewater and a low, constant, unavoidable, local to regional impact on municipal solid waste (MSW) management. The permanent disposal of MSW in a managed landfill would represent a duration ranking of “constant.” The following summarizes Project conditions that would impact wastewater flows generated during construction under Turbine Option 1:

- The Applicant anticipates that the maximum on-site workforce throughout the duration of the construction stage would be 467 temporary employees.
- The Applicant estimates that the Project’s construction workforce would consist of 60 percent local hires.
- The Washington State Department of Health states that the typical person in the United States generates an average daily wastewater flow of approximately 50 to 70 gallons (Washington State Department of Health 2002).
    - Based on the typical person’s average daily waste flow, the maximum amount of wastewater flows generated during the Project’s construction stage would be far less than 32,690 gallons.
- For comparison, the Kennewick Wastewater Treatment Plant receives 5.35 million gallons of wastewater per day.
- Because 60 percent of the construction workforce would be sourced locally, the waste quantities stated in the region’s waste management plans would include those generated by most of the Project’s workforce.

As noted in **Table 4.15-4**, solid waste from the Project’s construction would consist of various quantities of non-hazardous construction wastes. The landfills identified in the ASC maintain substantial capacity that would be sufficient to serve the Project and the region, simultaneously. For comparison, Benton County is expected to generate 326,505 tons of MSW in 2025.

An impact on human health and wellbeing could occur if the construction of Turbine Option 1 limited the availability of potable water to surrounding communities or reduces a community’s ability to manage wastewater or MSW. During the construction of Turbine Option 1, existing infrastructure (e.g., water treatment facilities, sewer systems, and landfills) and regulations governing the disposal of wastewater and MSW would minimize impacts from the use of water, production of wastewater, and disposal of MSW to human health and well being. Impacts on safety would result in a negligible, temporary to constant, unlikely, limited to regional impact.

Turbine Option 2

Construction activities under Turbine Option 2 would result in a low, short-term, unavoidable, local impact on wastewater and a low, constant, unavoidable, local to regional impact MSW management. Impacts on wastewater and MSW management resulting from construction under Turbine Option 2 would be similar to those presented for Turbine Option 1. Impacts from the use of water and generation of wastewater and MSW to human health and wellbeing during the construction of Turbine Option 2 would be similar to those presented for Turbine Option 1. Impacts on human health and wellbeing would result in a negligible, temporary to constant, unlikely, limited to regional impact.

Solar Arrays

Construction activities for the solar arrays would result in a low, short-term, unavoidable, local impact on wastewater and a low, constant, unavoidable, local to regional MSW management. Impacts on wastewater and MSW management resulting from construction of solar arrays would be similar to those presented for Turbine Option 1. Impacts from the use of water and generation of wastewater and MSW to human health and wellbeing during the construction of solar arrays would be similar to those presented for Turbine Option 1. Impacts on human health and wellbeing would result in a negligible, temporary to constant, unlikely, limited to regional impact.

Battery Energy Storage Systems

Construction activities for battery energy storage systems (BESSs) would result in a low, short-term, unavoidable, local impact on wastewater and a low, constant, unavoidable, local to regional impact on MSW management. Impacts on wastewater and MSW management resulting from construction of BESSs would be similar to those presented for Turbine Option 1. Impacts from the use of water and generation of wastewater and MSW to human health and wellbeing during the construction of BESSs would be similar to those presented for Turbine Option 1. Impacts on human health and wellbeing would result in a negligible, temporary to constant, unlikely, limited to regional impact.

Substations

Construction activities for substations would result in a low, short-term, unavoidable, local impact on wastewater and a low, constant, unavoidable, local to regional impact MSW management. Impacts on wastewater and MSW management resulting from construction of substations would be similar to those presented for Turbine Option 1. Impacts from the use of water and generation of wastewater and MSW to human health and wellbeing during the construction of substations would be similar to those presented for Turbine Option 1. Impacts on human health and wellbeing would result in a negligible, temporary to constant, unlikely, limited to regional impact.

Comprehensive Project

Construction activities for the comprehensive Project would result in a low, short-term, unavoidable, local impact on wastewater and a low, constant, unavoidable, local to regional impact on MSW management. Impacts on wastewater and MSW management resulting from construction of the comprehensive Project would be similar to those presented for Turbine Option 1. Impacts from the use of water and generation of wastewater and MSW to human health and wellbeing during the construction of the comprehensive Project would be similar to those presented for Turbine Option 1. Impacts on human health and wellbeing would result in a negligible, temporary to constant, unlikely, limited to regional impact.

4.15.2.2 Impacts during Operation

The on-site workforce for the operations stage of the Project is estimated to be between 16 and 20 full-time employees. Wastewater from the O&M facilities would be discharged to an on-site septic system. It is anticipated that the operations stage would use less than 5,000 gallons of water per day and that wastewater would be generated from kitchen and bathroom use.

Operation of the Project is expected to generate approximately one or two dumpsters of waste per week at the O&M facilities. All waste would be stored within designated temporary waste collection areas until it is collected for transport to an approved landfill. Materials that can be recycled would be stored and transported separately.

Turbine Option 1

It is anticipated that operation of the turbines under Turbine Option 1 would have a low, long-term, unavoidable, local impact on wastewater and a low, constant, unavoidable, local to regional impact on MSW management during the Project’s operations stage. It is anticipated that O&M facilities that would support turbine operations under Turbine Option 1 would use less than 5,000 gallons of water per day for kitchen and bathroom use. Wastewater associated with turbine operation under Turbine Option 1 would be discharged to an on-site septic system. The Benton-Franklin Health District is responsible for permitting, overseeing the design and installation of, and inspecting on-site septic systems with wastewater flows less than 3,500 gallons per day. For wastewater flows of more than 3,500 gallons, the Applicant would have to obtain approval from the Washington State Department of Health. Operation of the Project is expected to generate approximately one or two dumpsters of waste per week at the O&M facilities.

Turbine Option 2

O&M activities under Turbine Option 2 would result in a low, long-term, unavoidable, local impact on wastewater and a low, constant, unavoidable, local to regional impact on MSW management. Impacts on wastewater and MSW management resulting from turbine operations under Turbine Option 2 would be similar to those presented for Turbine Option 1.

Solar Arrays

O&M activities for the solar arrays would result in a low, long-term, unavoidable, local impact on wastewater and a low, constant, unavoidable, local to regional impact on MSW management. Impacts on wastewater and MSW management resulting from operation of the solar arrays would be similar to those presented for Turbine Option 1. Solar modules would be washed once per year during operations. Water used for solar panel washing would be allowed to infiltrate into the ground. The Applicant has not proposed treatment for solar panel wash water.

Battery Energy Storage Systems

Impacts on wastewater and MSW management resulting from operation of the BESSs would be similar to those presented for Turbine Option 1. O&M activities for the BESSs would result in a low, long-term, unavoidable, local impact on wastewater and a low, constant, unavoidable, local to regional impact on MSW management.

Substations

Impacts from substations to wastewater and MSW management would be similar to those presented for Turbine Option 1. O&M activities for the substations would result in a low, long-term, unavoidable, local impact on wastewater and a low, constant, unavoidable, local to regional impact on MSW management.

Comprehensive Project

Combined impacts on wastewater and MSW management resulting from operation of all Project components would be similar to those presented for Turbine Option 1. O&M activities for the comprehensive Project would result in a low, long-term, unavoidable, local impact on wastewater and a low, constant, unavoidable, local to regional impact on MSW management.

4.15.2.3 Impacts during Decommissioning

Decommissioning would be performed in accordance with the Washington Energy Facility Site Evaluation Council (EFSEC) rules and prior Site Certification Agreements and would comprise dismantling and removing aboveground improvements, including turbines and solar modules, step-up transformers, substations, BESSs, overhead generator tie lines and support structures, control hardware, and meteorological towers. Foundations would be removed to a level of no less than 3 feet below the surface of the ground unless requested to be maintained by the landowner. Cables, lines, and conduit that are buried more than 3 feet below grade may be abandoned in place.

As part of the decommissioning process, the Applicant would repurpose or reuse the Project’s high-value components. Recyclable materials would be reduced to a transportable size and removed from the site to an appropriately designated recycling center. Unsalvageable material would be reduced to a transportable size and removed from the site and permanently disposed of in accordance local, state, and federal solid waste regulations.

Turbine Option 1

Impacts on wastewater during decommissioning of turbines under Turbine Option 1 would be similar to those described for construction under Turbine Option 1. Decommissioning activities under Turbine Option 1 would result in a low, short-term, unavoidable, local impact on wastewater management. Demolition workers would each generate 50 to 70 gallons of wastewater per day that would require collection and disposal. Decommissioning activities under Turbine Option 1 would result in a low, constant, unavoidable, local to regional impact on MSW management. Generation and disposal of solid waste during the decommissioning stage for turbines under Turbine Option 1 would comprise the following:

- The blades would be cut down or dismantled into smaller sections for transport by regular-sized haul trucks.
- Turbines would be refurbished and resold or recycled.
- Turbine foundations would be removed to a depth of not less than 3 feet.
    - The concrete would be reduced in size by excavator attachments and transported for disposal off site.
- The meteorological towers would also be removed in a fashion similar to the turbines.
- Any geotextile fabric encountered during demolition would be taken to an approved landfill.

- All underground collection lines buried above not less than 3 feet below the surface would be removed.
  - The cables would be cut into manageable sections and removed from the site.
  - All recyclable materials such as copper wiring or other metals would be transported to approved locations for recycling.
- Pad-mounted transformers would be hauled off site for disposal.
- Concrete pads would be reduced in size by excavator attachments and transported for disposal off site.

As shown in **Table 4.15-4**, the ASC has identified landfills that have permitted lifespans greater than the estimated 35-year operations stage of the Project. Additionally, the landfills have a projected capacity sufficient to receive solid waste generated during the decommissioning stage of Turbine Option 1.

Turbine Option 2

Impacts on wastewater and MSW management from the decommissioning of turbines under Turbine Option 2 would be similar to those presented for Turbine Option 1. Decommissioning activities under Turbine Option 2 would result in a low, short-term, unavoidable, local impact on wastewater management. Decommissioning activities under Turbine Option 2 would result in a low, constant, unavoidable, local to regional impact on MSW management.

Solar Arrays

Decommissioning activities for the solar arrays would result in a low, short-term, unavoidable, local impact on wastewater management. Decommissioning activities for solar arrays would result in a low, constant, unavoidable, local to regional impact on MSW management. Generation and disposal of solid waste during the decommissioning stage for the solar array infrastructure are described below:

- The panels used in the Project would contain silicon, glass, and aluminum, which are recyclable. Modules would be dismantled and packaged per manufacturer or approved recycler specifications and shipped to an approved off-site recycler.
- Control cabinets, electronic components, and internal cables would be removed as part of the decommissioning stage. The panels, racks, and inverters would be transported whole for reconditioning and reuse or disassembled or cut into more easily transportable sections for salvageable, recyclable, or disposable components.
- Pads would be excavated to a depth sufficient to remove all anchor bolts, rebar, conduits, cable, and concrete to a depth of not less than 3 feet below grade.
  - The cables would be cut into manageable sections and removed from the site.
  - All recyclable materials such as copper wiring or other metals would be transported to approved locations for recycling.
  - All wire would be sent to an approved recycling facility.
- Concrete slabs used as equipment pads would be broken and removed to a depth of not less than 3 feet below grade. Clean concrete would be crushed and disposed of off site and/or recycled and reused on site or off site.

- All racking and fencing material would be broken down into manageable units, removed from the facility, and sent to an approved recycler.

As shown in **Table 4.15-4**, the ASC has identified landfills that have permitted lifespans greater than the estimated 35-year operations stage of the Project. Additionally, the landfills have a projected capacity sufficient to receive solid waste generated during the decommissioning stage of the solar arrays.

Battery Energy Storage Systems

Decommissioning activities for the BESSs would result in a low, short-term, unavoidable, local impact on wastewater management. Decommissioning activities for BESSs would result in a low, constant, unavoidable, local to regional impact on MSW management. Generation and disposal of solid waste during the decommissioning stage for the BESS infrastructure are described below:

- All aboveground structures, including the conductors, switches, transformers, fencing, and other components, would be dismantled and removed from the site.
- All recyclable materials such as copper wiring or other metals would be transported to approved locations for recycling.
- Batteries would be recycled if feasible and otherwise would be transported to an approved disposal facility.
- Concrete slabs used as equipment pads would be broken and removed to a depth of not less than 3 feet below grade. Clean concrete would be crushed and disposed of off site and/or recycled and reused on or off site.

As shown in **Table 4.15-4**, the ASC has identified landfills that have permitted lifespans greater than the estimated 35-year operations stage of the Project. Additionally, the landfills have a projected capacity sufficient to receive solid waste generated during the decommissioning stage of the BESSs.

Substations

Decommissioning activities for the substations would result in a low, short-term, unavoidable, local impact on wastewater management. Decommissioning activities for substations would result in a low, constant, unavoidable, local to regional impact on MSW management. Generation and disposal of solid waste during the decommissioning stage for substations are described below:

- Conductors, switches, transformers, fencing, and other components would be dismantled and removed from the site.
- All recyclable materials such as copper wiring or other metals would be transported to approved locations for recycling. All wire would be sent to an approved recycling facility.
- Concrete slabs used as equipment pads would be broken and removed to a depth of not less than 3 feet below grade. Clean concrete would be crushed and disposed of off site and/or recycled and reused on site or off site.

As shown in **Table 4.15-4**, the ASC has identified landfills that have permitted lifespans greater than the estimated 35-year operations stage of the Project. Additionally, the landfills have a projected capacity sufficient to receive solid waste generated during the decommissioning stage of the substations.

Comprehensive Project

Impacts on wastewater and MSW management from decommissioning of the comprehensive Project would be similar to those presented for each component. Decommissioning activities for the comprehensive Project would result in a low, short-term, unavoidable, local impact on wastewater management. Decommissioning activities for the comprehensive Project would result in a low, constant, unavoidable, local to regional impact on MSW management.

4.15.2.4 Applicant Commitments and Identified Mitigation

This section describes the measures that would reduce or compensate for impacts related to public services and utilities from construction, operation, and decommissioning of the Project. These measures would be implemented in addition to compliance with the environmental permits, plans, and authorizations required for the Proposed Action.

Applicant Commitments

The Applicant has identified measures and/or best practices that are designed to prevent or minimize potential impacts on the affected environment for the Project. Measures presented by the Applicant in the ASC (Horse Heaven Wind Farm, LLC 2021) and taken into consideration in the characterization of potential impacts on public services and utilities are discussed in Section 2.3 and summarized below.

- Turbine blades would be cut down or dismantled into smaller sections for transport by regular-sized haul trucks.
- Turbines would be refurbished and resold or recycled.
- All recyclable materials such as copper wiring or other metals would be transported to approved locations for recycling.
- Clean concrete37 would be crushed and disposed of off site and/or recycled and reused on site or off site.
- Modules would be dismantled and packaged per manufacturer or approved recycler specifications and shipped to an approved off-site recycler.

Recommended Mitigation Measures

Section 4.7 (Energy and Natural Resources) presents a list of recommended mitigation measures that would apply to decommissioning impacts on public services and utilities resulting from the Project:

ENR-5[38]: The Applicant would capture and recycle wash water to reduce the Project's water requirements during the operations stage.

ENR-7: To minimize the need for future extraction of natural resources, the Applicant would recycle all components of the Project that have the potential to be used as raw materials in commercial or industrial applications.

---

[37]Contain an aggregated weight of less than 1 percent of adherent fines, vegetable matter, plastics, plaster, paper, gypsum board, metals, fabrics, wood, tile, glass, asphalt (bituminous) materials, brick, porcelain or other deleterious substance(s) not otherwise noted. Be free of components such as chlorides and reactive materials that are detrimental to the concrete, unless mitigation measures are taken to prevent recurrence in the new concrete (WSDOT 2022).

[38] ENR-: Identifier of numbered mitigation item for Energy and Natural Resources, as described in Section 4.7

Additionally, EFSEC has identified the following mitigation measure that addresses the disposal of non-recyclable project components:

PSU-1[39]: To address the potential for the inappropriate disposal of Project waste, the Applicant would dispose of all non-recyclable Project components in an appropriately licensed waste disposal facility.

4.15.2.5 Significant Unavoidable Adverse Impacts

Determining the significance of an impact involves context and intensity, which, in turn, depend on the magnitude and duration of an impact. "Significant" in the Washington State Environmental Policy Act means a reasonable likelihood of more than a moderate adverse impact on environmental quality. An impact may also be significant if its chance of occurrence is not great, but the resulting environmental impact would be severe if it occurred (WAC 197-11-794).

This Draft Environmental Impact Statement weighs the potential impacts on public services and utilities that may result from the Proposed Action with mitigation and makes a resulting determination of significance for each impact in **Tables 4.15-5a, 4.15-5b, and 4.15-5c**.

[39] PSU-: Identifier of numbered mitigation item for Public Services and Utilities

Table 4.15-5a: Summary of Potential Impacts on Public Services and Utilities during Construction of the Proposed Action

Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact: ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact: ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact: ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact: ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Wastewater	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	The amount of wastewater produced from the maximum number of temporary workers on site (467), while measurable, would not impact the ability of the local utility to treat the community's sewage.	Low	Short Term	Unavoidable	Local	No mitigation identified	None identified
Municipal Solid Waste	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Solid waste from the Project's construction would consist of various quantities of non-hazardous construction wastes. The landfills identified in the ASC maintain substantial capacity that would be sufficient to serve the Project and the region, simultaneously.	Low	Constant	Unavoidable	Local to Regional (depending on location of landfill)	**ENR-7:** Recycle all applicable components **PSU-1:** Use of a licensed waste disposal facility	None identified
Safety	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	The impact on human health and wellbeing would result from a reduction in potable water in the surrounding community or the capability to management wastewater and construction debris.	Negligible	Temporary (accident) Constant (storage)	Unlikely	Limited to Regional (depending on location of disposal facility)	No mitigation identified	None identified

Notes:
(a) The impacts related to each component, including "comprehensive Project," were rated separately; components were combined in the same cell if they received the same impact ratings for the identified topic.
(b) Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.
(c) Mitigation measures listed here are additional actions that EFSEC could impose to further reduce the impacts. See Section 4.1 Introduction for details.
(d) Significant unavoidable impacts are those that would remain even after all identified additional mitigation measures have been required by EFSEC.
ASC = Application for Site Certification; BESS = battery energy storage system; EFSEC = Washington Energy Facility Site Evaluation Council

Table 4.15-5b: Summary of Potential Impacts on Public Services and Utilities during Operation of the Proposed Action

Topic	Component[a]	Description of Impact[b]	Magnitude of Impact: ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact: ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact: ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact: ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Wastewater	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Wastewater from the O&M facilities would be discharged to an on-site septic system. It is anticipated that the operations stage would use less than 5,000 gallons of water per day and that wastewater would be generated from kitchen and bathroom use.	Low	Long Term	Unavoidable	Local	**ENR-5:** Capture and recycle wash water	None identified
Municipal Solid Waste	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Operation of the Project is expected to generate approximately one or two dumpsters of waste per week at the O&M facilities.	Low	Constant	Unavoidable	Local to Regional (depending on location of landfill)	**PSU-1:** Use of a licensed waste disposal facility	None identified

Notes:
(a) The impacts related to each component, including "comprehensive Project," were rated separately; components were combined in the same cell if they received the same impact ratings for the identified topic.
(b) Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.
(c) Mitigation measures listed here are additional actions that EFSEC could impose to further reduce the impacts. See Section 4.1 Introduction for details.
(d) Significant unavoidable impacts are those that would remain even after all identified additional mitigation measures have been required by EFSEC.
BESS = battery energy storage system; EFSEC = Washington Energy Facility Site Evaluation Council; O&M = operations and maintenance

Table 4.15-5c: Summary of Potential Impacts on Public Services and Utilities during Decommissioning of the Proposed Action

Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact: ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact: ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact: ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact: ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Wastewater	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	The amount of wastewater produced from the temporary workers on site, while measurable, would not impact the ability of the local utility to treat the community's sewage.	Low	Short Term	Unavoidable	Local	No mitigation identified	None identified
Municipal Solid Waste	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	After dismantling of the facility, high-value components would be removed for scrap value. The remaining materials would be reduced to transportable size and removed from the site for disposal. Existing facilities would maintain capacity to receive the Project's non-recyclable waste and continue to serve their communities.	Low	Constant	Unavoidable	Local to Regional	**ENR-7**: Recycle all applicable components **PSU-1**: Use of a licensed waste disposal facility	None identified

Notes:
(a) The impacts related to each component, including "comprehensive Project," were rated separately; components were combined in the same cell if they received the same impact ratings for the identified topic.
(b) Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.
(c) Mitigation measures listed here are additional actions that EFSEC could impose to further reduce the impacts. See Section 4.1 Introduction for details.
(d) Significant unavoidable impacts are those that would remain even after all identified additional mitigation measures have been required by EFSEC.
BESS = battery energy storage system; EFSEC = Washington Energy Facility Site Evaluation Council

4.15.3 Impacts of No Action Alternative

Under the No Action Alternative, impacts related to public services and utilities from the construction, operation, and decommissioning of the Proposed Action would not occur. For the purpose of this analysis, it is assumed that no future development would occur within the Lease Boundary.

This Page Intentionally Left Blank

4.16 Socioeconomics

This section describes potential impacts on socioeconomics from the proposed Horse Heaven Wind Farm (Project, or Proposed Action) or under the No Action Alternative. Under Washington Administrative Code (WAC) 197-11-448, socioeconomics includes the general welfare, social, and economic conditions that contribute to an area's quality of life. Section 3.16 describes the socioeconomic conditions within the vicinity of the Project and within a 1-hour commute of the Lease Boundary. The Project vicinity includes the areas 4 miles south/southwest of the City of Kennewick, Washington, and the larger Tri-Cities urban area along the Columbia River. The study area for socioeconomics includes the area within the Lease Boundary and the populations of Benton, Franklin, Walla Walla, and Yakima Counties.

Sections 3.13 and 4.13, Public Health and Safety focus on the availability of public service agencies and medical facilities (e.g., law enforcement, fire protection, and medical emergency services) within the vicinity of the Lease Boundary. Sections 3.15 and 4.15, Public Services and Utilities focus on utilities that serve the Project vicinity. The qualitative evaluation presented herein relies on the impact scale defined in Section 4.1 and summarized in **Table 4.16-1**.

Table 4.16-1: Impact Rating Table for Socioeconomics from Section 4.1

Factor	Rating →			
Magnitude	**Negligible** indistinguishable from the background	**Low** small impact, non-sensitive receptor(s)	**Medium** intermediate impact, may occur on sensitive receptor(s) or affect public health and safety	**High** large impact on sensitive receptor(s) or affecting public health and safety
Duration	**Temporary** infrequently during any stage	**Short Term** duration of construction or site restoration	**Long Term** during operation or operation plus another stage of Project	**Constant** during life of Project and/or beyond the Project
Likelihood	**Unlikely** not expected to occur	**Feasible** may occur	**Probable** expected to occur	**Unavoidable** inevitable
Spatial Extent/Setting	**Limited** small area of Lease Boundary or beyond Lease Boundary if duration is temporary	**Confined** within Lease Boundary	**Local** beyond Lease Boundary to neighboring receptors	**Regional** beyond neighboring receptors

Table 4.16-2 defines the qualitative framework used herein to rank the magnitude impact. **Table 4.16-2** presents impact magnitude in reference to the three indicators of socioeconomics identified in WAC 197-11-448.

Table 4.16-2: Criteria for Assessing Magnitude of Impacts on Socioeconomics

Magnitude of Impacts	Description
Negligible	**General Welfare:**[a] No noticeable or quantifiable change in the health, peace, morality, or safety of the study area's residents. **Social Conditions:**[b] No noticeable or quantifiable change in healthcare, empowerment, housing, or other programs geared toward assisting the poor, unemployed, and marginalized in society. **Economic Environment:**[c] No noticeable or quantifiable change in the external economic factors that influence buying habits of consumers and businesses and therefore affect economic performance locally. **Environmental Justice:** No noticeable impact or quantifiable change in the general welfare, social conditions, or economic environment of people of color or low-income communities.
Low	**General Welfare:** Adverse changes in the health, peace, morality, or safety of the study area's residents would be small and within applicable regulatory standards. **Social Conditions:** Small but measurable adverse changes in healthcare, empowerment, housing, or other programs geared toward assisting the poor, unemployed, and marginalized in society. **Economic Environment:** A reduction in the external economic factors that influence buying habits of consumers and businesses would be small but quantifiable and therefore adversely affect economic performance locally. **Environmental Justice:** Small adverse changes in the general welfare, social conditions, or economic environment of people of color or low-income communities, but their health, safety, and economic security would not be harmed more so than surrounding non-EJ populations.
Medium	**General Welfare:** Adverse changes in the health, peace, morality, or safety of the study area's residents would be intermediate. **Social Conditions:** Intermediate adverse changes in healthcare, empowerment, housing, and other programs geared toward assisting the poor, unemployed, and marginalized in society from historic or existing conditions. **Economic Environment:** Intermediate reduction in the external economic factors that have historically influenced buying habits of consumers and businesses and therefore affect the economic performance locally. **Environmental Justice:** Adverse intermediate changes in the general welfare, social conditions, and economic environment of people of color or low-income communities would occur. Adverse impacts on specific conditions or services may temporarily impact people of color and low-income communities more than surrounding non-EJ populations but their health, safety, and economic security would not be permanently harmed.

Table 4.16-2: Criteria for Assessing Magnitude of Impacts on Socioeconomics

Magnitude of Impacts	Description
High	**General Welfare:** Meaningful decrease in the health, peace, morality, and safety of the study area's residents, possibly over an extended period. **Social Conditions:** Meaningful decrease in healthcare, empowerment, housing, and other programs geared toward assisting the poor, unemployed, and marginalized in society, possibly over an extended period. **Economic Environment:** Meaningful reduction in the external economic factors that influence buying habits of consumers and businesses and therefore affect the performance of the study area. **Environmental Justice:** Low-income and people of color communities would experience meaningful changes in their general welfare, social conditions, or economic environment. Low-income and people of color communities would disproportionately experience adverse permanent changes to their health, safety, or economic security when compared to surrounding non-EJ populations.

Sources:
[a] U.S. Congress n.d.
[b] U.S. Department of Health and Human Services n.d.
[c] Business Development Bank of Canada n.d.

4.16.1 Method of Analysis

This evaluation of socioeconomics is based on existing conditions data that describe the general welfare, social, and economic conditions of the study area and the economic impact analysis presented in Section 3.16 and in the Application for Site Certification (ASC) for the Project's construction and operations stages. Potential impacts on socioeconomics from the decommissioning stage are estimated based on the economic impact analysis for the construction and operations stages presented in the ASC (Horse Heaven Wind Farm, LLC 2021).

This evaluation of socioeconomics analyses potential impacts from the Proposed Action in the context of the example phased approach to construction presented by Horse Heaven Wind Farm, LLC (Applicant):

This Draft Environmental Impact Statement (EIS) considers the impact of the Project as a whole. To align the impact rating system described by the Applicant's socioeconomics impact analysis in the ASC, this evaluation of impacts to socioeconomics analyzes potential impacts from the Proposed Action in the context of the Applicant's example of a phased approach to construction:

- Phase 1 construction could generate power via wind and solar. Phase 1 could also include a battery energy storage system (BESS) capable of storing energy.
- Phase 2 construction is divided into Phase 2a and Phase 2b, summarized as follows:
  - Phase 2a could consist of the construction of both wind and solar facilities. The Applicant's Phase 2a scenario also includes the construction of a BESS.
  - Phase 2b could increase power generation via the construction of additional wind turbines, but construction would not include a BESS.

Chapter 2 contains more information on the Applicant's example of a phased approach to construction. The construction schedule, including phasing of specific elements of the Project, could alter the details of the analysis.

Economic Impact Analysis

The ASC assessed economic impacts in terms of employment, labor income, and economic output using the IMPLAN economic modeling package. The Applicant's analysis relied on IMPLAN data from 2019. Impacts are assessed using a multi-county model with data specific to Benton and Franklin Counties. The Applicant provided separate economic analyses for the example phased approach to construction and operations.

Appendix 4.16-1 provides detailed information about the IMPLAN model, Project data used to calculate economic impacts, and estimated economic output data for the Project's construction and operations stages. The IMPLAN model reports economic impacts using output, jobs, and personal income. The economic metrics presented by IMPLAN are defined as follows:

- **Output:** The value of goods and services produced, which serves as a broad measure of economic activity.
- **Jobs:** Measured as the average number of employees engaged in full- or part-time work. For this analysis, model outputs are subsequently adjusted to full-time equivalents (FTEs) using coefficients provided by IMPLAN. Job estimates are presented in FTEs or job-years, with each identified job representing 12 months (2,080 hours) of employment.
- **Personal income (or labor income)**: Expressed as the sum of employee compensation and proprietary income. Project-related personal income may be broken down as follows:
  - Employee compensation (wages) includes workers' wages and salaries, as well as other benefits such as health, disability, and life insurance; retirement payments; and non-cash compensation, expressed as total cost to the employer.
  - Proprietary income (business income) represents the payments received by small-business owners or self-employed workers (Florida State University 2000).

Impact Types

Economic multipliers derived from the IMPLAN model are used to estimate total economic impacts. Total economic impacts consist of three components: direct, indirect, and induced. These three components are described as follows:

- **Direct:** The direct impact component consists of expenditures made specifically for the proposed facility, such as construction labor and materials. These direct impacts generate economic activity elsewhere in the local economy through the multiplier effect, as initial changes in demand "ripple" through the local economy and generate indirect and induced impacts. For the analysis presented in the ASC, the direct component was based on labor expenditures only and did not include direct expenditures on materials, which are included as part of the indirect impact analysis. Direct impacts could result from increases in population, increased demand for housing, and increased income and jobs added to the local economy (USDA 2003).
- **Indirect:** Indirect impacts are generated by the expenditures on goods and services by suppliers who provide goods and services to a construction project. Indirect effects are often referred to as "supply-chain" impacts because they involve interactions among businesses. For the analysis of the Proposed Action, indirect impacts also include the effects of direct expenditures on materials. Indirect impacts could result from increases in indirect and induced income and jobs added to the local economy (USDA 2003).

- **Induced:** Induced impacts are generated by the spending of households associated either directly or indirectly with the proposed facility. Workers employed during construction, for example, will use their income to purchase groceries and other household goods and services. Workers at businesses that supply the facility during construction or operation will do the same. Induced effects are sometimes referred to as "consumption-driven" impacts (USDA 2003).

Environmental Justice

Revised Code of Washington (RCW) 70A.02.010 defines environmental justice (EJ) as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, rules, and policies. EJ includes addressing disproportionate environmental and health impacts in all laws, rules, and policies with environmental impacts by prioritizing vulnerable populations and overburdened communities, the equitable distribution of resources and benefits, and eliminating harm (RCW 70A.02.010).

The U.S. Environmental Protection Agency (EPA) defines the term "fair treatment" to mean that "no group of people should bear a disproportionate burden of environmental harms and risks, including those resulting from the negative environmental consequences of industrial, governmental, and commercial operations or programs and policies." The term "disproportionate impacts" refers to differences in impacts or risks that are extensive enough that they may merit action (EPA 2016).

Executive Order 12898 addresses people of color populations, low-income populations, and indigenous peoples as population groups of concern in considering potential EJ implications of a regulatory action (EPA 2016). According to the Council on Environmental Quality (CEQ), to be considered an EJ community, a community must have a high percentage of people of color population or a significant amount of its population living at or below the poverty level per U.S. Census data. Demographics data can be used to analyze trends to identify potentially disproportionate impacts on low-income and people of color communities (CEQ 1997).

RCW 19.405.020 defines low-income as:

> *Household incomes as defined by the department or commission, provided that the definition may not exceed the higher of eighty percent of area median household income or two hundred percent of the federal poverty level, adjusted for household size.*

This evaluation of socioeconomics applied the federal and state definitions of EJ to the analysis of people of color and low-income communities. Considering the location of the Project, and the fact that Benton County has the lowest percentage of low-income and people of color population, in comparison to other counties within the Project study area, Benton County was selected as a conservative reference community for the analysis of low-income and people of color communities in this study. Therefore, data on people of color and low-income populations in the study area were compared to the population characteristics of Benton County. If the percentage of people of color or low-income populations within the studied census block groups was greater than Benton County, the block group was identified as a people of color and/or a low-income community.

Communities of color were identified using census data for all people who identify as a race other than white alone (e.g., list their ethnicity as Hispanic or Latino). Low-income populations are defined in this report as the percentage of people living at or below twice the federal poverty level. For more information on the definitions of people of color and low-income, and data sources used to identify these communities, refer to Section 3.16.

For the evaluation of EJ in this section, changes in air quality, noise, increased transit times, availability of affordable housing, and losses of income or jobs represent potential impacts on people of color and low-income communities.

4.16.2 Impacts of Proposed Action

This analysis of potential impacts of the Proposed Action addresses population, economic conditions, housing, and EJ. The economic impact analysis presented in the ASC indicates that Project-induced economic activity is not expected to result in indirect population growth or a related demand for housing capacity (Horse Heaven Wind Farm, LLC 2021).

The Project would generate both direct and indirect impacts on local tax revenues. Indirect impacts on the region's general welfare from potential changes in air quality, health and safety, and transportation are evaluated in Sections 4.3, 4.13, and 4.14, respectively. The following summarizes the study area with regards to the CEQ EJ definition for low-income and people of color communities, as well as low-income communities as described in RCW 19.405.020:

- Communities with a population of people of color higher than 50 percent are located in Franklin County (54 percent Hispanic alone) and Yakima County (51 percent Hispanic alone) (Table 3.16-2).
- White alone represents the majority population in the six census block groups that intersects with or are located adjacent to the Project Lease Boundary. However, as shown in Table 3.16-3, Census Tract 116, Block Group 1, had a higher percentage of people of color (44 percent compared to the reference community, Benton County [29 percent]).
- The percentage of low-income population in all four counties within the study area is higher than the percentage of low-income population in the State of Washington as a whole (24 percent). Yakima County, with 43 percent, has the highest, and Benton County, with 26 percent, has the lowest percentage of people of color in the study area (Table 3.16-3).
- The percentage of low-income population in Benton County (26 percent) is only 2 percent higher than the percentage of low-income population in Washington State (24 percent). As stated in Section 4.16.1, Benton County is the reference community for the analysis of low-income within the census block groups that intersect with or are located adjacent to the Project Lease Boundary.
- The low-income population in Census Tract 115.01 Block Group 1, with 41 percent low-income, and Census Tract 118.01, Block Group 3, with 31 percent low-income, are higher than the low-income population of the reference community (Benton County with 26 percent) (Table 3.16-4).
- White alone represents the majority population in the six census block groups that intersect with or are adjacent to the Project Lease Boundary. The percentage of people of color for the six census block groups together (18 percent) is well below the identified threshold for this analysis (29 percent). However, Census Tract 116, Census Block Group 1, is an identified community of color because the percentage of people of color in this block group (45 percent) is greater than the percentage of people of color in the identified reference community, Benton County (29 percent) (see Section 3.16 for additional details).
- While the percentage of low-income population for the six census block groups together (14 percent) is well below the identified low-income threshold for this analysis (26 percent), Census Tract 115.01, Block Group 1 and Census Tract 118.01, Block Group 3, with 41 percent and 31 percent of low-income population,

respectively, exceed the low-income threshold (26 percent) and are identified as low-income communities (refer to Section 3.16 for additional details).

- Census Tract 116, Block Group 1, spans a very large area, with majority of it outside the Project Lease Boundary. This census block group is among the least populated of the six census block groups, yet it is the largest block group that intersects the Project Lease Boundary. Based on the review of the arial imagery, this block group contains very little built-up development in the form of dispersed housing. In addition, the proximity values to other EJ indicators, such as superfund sites, traffic, and hazardous waste, are low in this area.
- Similarly, while Census Tract 118.01, Block Group 3, is the second largest census block group (after Census Tract 116, Block Group 1) that intersects with the Project Lease Boundary, compared to other block groups it has the lowest population of individuals for whom income status is determined (see Section 3.16 for details). Also, large portions of this block group are located outside of the Project Lease Boundary. Review of aerial imagery indicated there is a very low amount of built-up development and scattered dispersed housing in this census block group. Also, proximity values to other EJ indicators, such as superfund sites, traffic, and hazardous waste are low for this census block group.
- Census Tract 115.01, Block Group 1 is the only census block group (among the six) that is completely outside the Project Lease Boundary but is located adjacent to the Project Lease Boundary (Figure 3.16-2). This census block group is also among the least populated block groups (1,077 individuals for whom income status is determined). Review of aerial imagery indicated a low amount of built-up development in the majority of the areas within this census block group. Proximity values to other EJ indicators, such as superfund sites, traffic, and hazardous waste, are low for this census block group.

4.16.2.1 Impacts during Construction

According to the ASC, the largest share of the overall construction cost of wind-energy-generating facilities consists of the purchase and transportation of equipment (e.g., turbines, blades, and towers) to the Project site. Similarly, Project-related materials and equipment such as solar modules, inverters, BESSs, electrical components, and mounting account for the largest share of the overall construction cost for solar facilities. The Applicant anticipates acquiring these technical project components outside the study area (Horse Heaven Wind Farm, LLC 2021).

Economic Conditions

Construction Expenditures

Construction expenditures are the money spent or allocated to the cost of real property. This includes the cost of constructing or making improvements to real property. The Applicant anticipates that the following construction expenditures would occur in the study area:

- **Balance of Plant for Wind Turbines**. Local expenditures are expected to include everything but the actual wind turbines (e.g., concrete, rebar, and other construction materials; electrical components; and cabling required to prepare the sites).
- **Balance of System for Solar Arrays**. Local expenditures are expected to include everything but the actual solar array (e.g., concrete, rebar, and other construction materials; electrical components; and cabling required to prepare the sites) (Horse Heaven Wind Farm, LLC 2021).

The Applicant's economic impact analysis states that other expenditures expected to occur in the study area include those related to engineering, legal services, substation and transmission line construction, and operations and maintenance (O&M) building construction. Of these local expenditures, the Applicant anticipates that upgrades to the Bonneville Power Administration network would need to occur to accommodate the energy that would be generated by the Project (Horse Heaven Wind Farm, LLC 2021).

The ASC concludes that installation labor-related expenditures that occur in the counties within the study area would result in economic impacts elsewhere in the local economy. For instance, workers temporarily relocating to the Project vicinity for the duration of their on-site employment would spend per diem money throughout the study area on food, lodging, and clothing (Horse Heaven Wind Farm, LLC 2021).

Fiscal Impact

The fiscal impact analysis prepared as part of the ASC estimated local tax revenues that would be expected to accrue as a result of the Project's construction. Sales and use tax revenues from construction would be one-time revenues generated during the Proposed Action's construction stage.

Sales and Use Tax

Tax imposed under RCW 82.08.020 does not apply to the sales of machinery and equipment used directly in generating electricity from renewable sources or to sales of or charges made for labor and services rendered in respect to installing such machinery and equipment. The economic impact analysis presented in the ASC assumed that procurements subject to state and local sales tax are limited to items not used directly to generate electricity. The exemption may be claimed in the form of a sales or use tax remittance of 50 percent, 75 percent, or 100 percent of the sales or use tax paid on qualified machinery and equipment, and installment labor and services (RCW 82.08.962; RCW 82.12.962).

The economic impact analysis presented in the ASC states that the Project would attempt to meet RCW 82.08.962 criteria for a 100 percent remittance of sales tax paid on qualified machinery, equipment, and installment labor and services. These criteria include certification by the Washington State Department of Labor and Industries that the Project was developed under a community workforce agreement or project labor agreement (Horse Heaven Wind Farm, LLC 2021).

While a considerable portion of construction-related materials and labor services would be exempt from Washington State sales and use tax, the following describes the types of construction expenditures that would not be shielded from duties under RCW 82.08.962:

- Local purchases of concrete, rebar, and other raw construction materials
- Expenditures related to O&M building construction
- Local expenditures by construction workers

The following presents the sales tax estimates for the Project's example phased construction:

- Phase 1 construction would generate one-time revenues of approximately $2.9 million in state and $1.0 million in local sales tax (Horse Heaven Wind Farm, LLC 2021).
- Phase 2 (i.e., Phase 2a and 2b) construction would generate one-time revenues of $2.2 million to $3.7 million in state sales tax, and $0.7 million to $1.2 million in local sales tax. Phase 2a represents the lower of the range of both estimates (Horse Heaven Wind Farm, LLC 2021).

Employment, Labor Income, and Economic Output

Table 1 in **Appendix 4.16-1** shows the distribution of average on-site workforce per month by type of employment for each task. **Table 2** in **Appendix 4.16-1** presents estimated construction impacts for Phases 1, 2a, and 2b. The Project's direct impacts on on-site employment as estimated by IMPLAN are summarized below (Horse Heaven Wind Farm, LLC 2021):

- **Phase 1**: Construction of the Project is estimated to create approximately 171 on-site FTE jobs filled by local workers.
- **Phase 2a**: Construction of Phase 2a is estimated to create approximately 152 on-site FTE jobs filled by local workers.
- **Phase 2b**: Construction of Phase 2b is estimated to create 136 on-site FTE construction jobs filled by local workers.

In addition to providing on-site jobs, the Project's construction stage would also support employment, labor income, and economic output in other sectors of the local economy. The IMPLAN estimates for indirect job creation are summarized as follows:

- **Phase 1**: Construction of the Project is estimated to indirectly create 168 jobs.
- **Phase 2a**: Construction of the Project is estimated to indirectly create 199 jobs.
- **Phase 2b**: Construction of the Project is estimated to indirectly create 269 jobs.

The higher number of indirect jobs for Phase 2b is mainly due to local expenditures on construction materials and transmission line-related expenditures, both of which are estimated to be higher for Phase 2b than for Phase 2a (Horse Heaven Wind Farm, LLC 2021). As new income originating from the Project is spent throughout the local economy, the increased economic activity would support induced job creation in unrelated sectors. The IMPLAN estimates for induced job creation are summarized as follows:

- **Phase 1**: Construction of the Project is estimated to support an additional 118 jobs.
- **Phase 2a**: Construction of the Project is estimated to support a further 120 jobs.
- **Phase 2b**: Construction of the Project is estimated to support an additional 135 jobs.

The IMPLAN estimated total jobs and income from the Project are summarized as follows:

- **Phase 1**: Overall, construction of Phase 1 is estimated to support a total of approximately 458 jobs in Benton and Franklin Counties and approximately $37.0 million in labor income, with total economic output of approximately $70.6 million.
- **Phase 2**: Overall, construction of Phase 2 is estimated to support a total of 472 to 539 jobs in Benton and Franklin Counties and approximately $37.6 million to $41.9 million in labor income, with total economic output of approximately $73.0 million to $85.7 million (Horse Heaven Wind Farm, LLC 2021).

As indicated in **Tables 2 3** in **Appendix 4.16-1**, construction of the Project would generate economic benefits in the regional economy through direct expenditures for materials and services, as well as new payroll income and both indirect and induced economic benefits. In summary, the Proposed Action would generate local jobs and tax revenue. As a result of these benefits, the Project is not anticipated to have adverse impacts on the study area's economic conditions.

Housing

As indicated in Tables 3.16-5 and 3.16-6 in Section 3.16, vacant housing exists throughout the study area, and the study area maintains substantial short term rental options that include hotels, motels, campgrounds, and recreational vehicle parks. Based on the Applicant's acknowledgment that most construction workers would be sourced locally, and on the availability of short term and long-term rentals throughout the study area, the example Action's construction stage (i.e., Phase 1, Phase 2a, and Phase 2b) would result in a negligible, temporary to short term, feasible, regional impact on housing availability. Adverse impacts would occur if a reduction in short term and long-term rentals reduces supply enough that it causes an increase in rental prices.

Analysis of Project impacts on housing during construction, and impact ratings for this topic, are informed by consideration of all construction activities combined.

Environmental Justice

Table 4.16-3 presents an analysis and ranking of construction impacts on economic conditions and housing availability for the people of color and low-income communities identified in Section 3.16.

Table 4.16-3: Impact of Project Construction on People of Color and Low-Income Communities

Geographic Area	Demographics	Impact on Economic Conditions	Impact on Housing Availability
Franklin County	People of color population of 59% (54% Hispanic alone) (higher than reference threshold: 29%). Low-income population of 34% (higher than reference threshold for low-income: 26%).	Within Franklin County, it is anticipated that the Project would increase economic input, labor income, and tax revenue, which would result in no adverse impact on economic conditions.	With a vacancy rate of 2.7%, 217 units available for rent, and the majority of workers being sourced locally, the construction stage would have a low, short term, feasible, regional impact on housing availability in Franklin County.
Yakima County	People of color population of 57% (51% Hispanic alone) (higher than reference threshold: 29%). Low-income population of 43% (higher than reference threshold for low-income: 26%).	Data not available[a]	With a vacancy rate of 2.8%, 793 units available for rent, and the majority of workers being sourced locally, the construction stage would have a low, short-term, feasible, regional impact on housing availability in Yakima County.
Walla Walla County	Low-income population of 31% (higher than reference threshold for low-income: 26%).	Data not available[a]	With a vacancy rate of 6.1%, 466 units available for rent, and the majority of workers being sourced locally, the construction stage would have a low, short-term, feasible, regional impact on housing availability in Walla Walla County.

Table 4.16-3: Impact of Project Construction on People of Color and Low-Income Communities

Geographic Area	Demographics	Impact on Economic Conditions	Impact on Housing Availability
Census Tract 116, Block Group 1, (Lease Boundary)	People of color population of 45% (44% Hispanic alone) (higher than reference threshold: 29%).	Within Benton County, it is anticipated that the Project would increase economic input, labor income, and tax revenue, which would result in no adverse impact on economic conditions.	Based on Benton County's vacancy rate of 5.1%, 1,660 units available for rent, and the majority of the workers being sourced locally, the construction stage would have a low, short-term, feasible, regional impact on housing availability in Census Tract 116, Block Group 1.
Census Tract 115.01, Block Group 1, (Lease Boundary)	Low-income population of 41% (higher than reference threshold: 26%).	Within Benton County, it is anticipated that the Project would increase economic input, labor income, and tax revenue, which would result in no adverse impact on economic conditions.	Based on Benton County's vacancy rate of 5.1%, 1,660 units available for rent, and the majority of the workers being sourced locally, the construction stage would have a low, short-term, feasible, regional impact on housing availability in Census Tract 115.01, Block Group 1.
Census Tract 118.01, Block Group 3 (Lease Boundary)	Low-income population of 31% (higher than reference threshold: 26%).	Within Benton County, it is anticipated that the Project would increase economic input, labor income, and tax revenue, which would result in no adverse impact on economic conditions.	Based on Benton County's vacancy rate of 5.1%, 1,660 units available for rent, and the majority of the workers being sourced locally, the construction stage would have a low, short-term, feasible, regional impact on housing availability in Census Tract 118.01, Block Group 3.

Source: Section 3.16 of this Draft EIS

Notes:

(a) The Applicant's IMPLAN analysis focused on Benton and Franklin Counties; Yakima and Walla Walla Counties were not included in the economic impact analysis.

This analysis of construction impacts is informed by consideration of all construction activities combined and incorporates the impact ranking from Section 4.3, Air Quality; 4.10, Visual Aspects, Light and Glare; Section 4.11, Noise and Vibration; Section 4.12, Recreation; and Section 4.14, Transportation. The analysis of air quality, noise, increased transit times, and availability of affordable housing indicates that the Project would adversely impact all people that intersect the Lease Boundary and study area including people of color and low-income communities within the study area. The following are examples of adverse impacts identified in the evaluation of air quality, visual aesthetics and recreation, noise and vibration, and transportation that could also impact communities located near the Project by introducing changes to the environmental settings such as traffic, noise levels, air quality, visual quality, and quality of use at recreational sites:

- Increased truck traffic on rural roadways may noticeably increase fugitive dust in identified people of color and low-income communities that intersect the Lease Boundary (Section 4.3, Air Quality).
- Construction and the erection of turbines could obstruct views from residences or views of or from recreation resources (4.10 Visual Aspects, Light and Glare; Section 4.12, Recreation).
- Construction noise impacts within the Project Lease Boundary could be loud enough at times to temporarily interfere with speech communication outdoors and indoors with windows open (Section 4.11).
- During Project construction, many construction vehicles, including trucks with oversized and overweight loads, would need to share the existing roadway network with the general public (Section 4.15).

The magnitude of impacts from construction of the Project is anticipated to be negligible for light, low for glare, medium for visual aspects (Sections 4.10), negligible to low for air quality (Section 4.3), low to medium for noise (Section 4.11), and medium for recreational sites (Section 4.12). Impacts from the combined construction of the Project on people of color and low-income communities would be low to medium in magnitude, short term due to the potential for impacts to occur during the entire construction stage, unavoidable, and confined to regional in spatial extent.

The Proposed Action is not anticipated to disproportionately impact people of color or low-income communities because:

- The Lease Boundary and study area span multiple communities, the majority of which are not communities of low income or people of color;
- The communities within the Lease Boundary and near the Lease Boundary have a combined low-income population and a combined people of color population that are very similar to those of the reference community (Benton County).
- The communities (e.g., census block groups) that were identified as communities of low income or people of color, have low populations and dispersed urban development within large census areas, in areas farther away from the Project.
- The communities that were identified as communities of low-income or people of color are not at greater risk of impacts from other environmental stressors (i.e., proximity to traffic, superfund sites, hazardous waste facilities).

4.16.2.2 Impacts during Operation

Once the construction stage is complete, the Project's operations stage would continue to contribute to the local economy. The Project would provide direct operation-related employment and expenditures. A team of 16 to 20 personnel would be employed to operate and maintain Project components. Operations staff would include a facility manager, a Project site manager, a Project site lead, and a certified crew of technicians (Horse Heaven Wind Farm, LLC 2021). Activities and expenditures during the operations stage are summarized below:

- The Project would require preventive and corrective maintenance of the turbines, solar arrays, BESSs, electrical collection system, and substations.

- Routine inspections would be conducted to ensure continuing plant and transmission system safety and reliability.
- Vehicle-related expenditures would include fuel costs, site maintenance, replacement parts and equipment, and miscellaneous supplies (Horse Heaven Wind Farm, LLC 2021).

Lease payments to landowners would also generate annual benefits to the local economy over the expected 35-year operating life of the Project.

Population

Employment and Labor Income

Table 3 in **Appendix 4.16-1** presents estimated operations impacts for example construction Phases 1, 2a, and 2b. Annual average impacts are based on estimated operations and maintenance expenditures for a 35-year period of operation. The following summarizes the direct impacts of the Project's operations on on-site employment as estimated by IMPLAN:

- **Phase 1**: Eleven FTEs would be employed on site to operate and maintain the Phase 1 portion of the Project.
- **Phase 2 (i.e., Phase 2a and 2b)**: Nine FTEs would be employed on site to operate and maintain the facility.

On-site workers would be hired from the local population in Benton and Franklin Counties or within the larger study area. Operation and maintenance of the Project would also support employment, labor income, and economic output in other sectors of the local economy (Horse Heaven Wind Farm, LLC 2021). In addition to providing on-site jobs, operation of the Project would also support employment, labor income, and economic output in other sectors of the local economy. The IMPLAN estimates for indirect job creation are summarized as follows:

- **Phase 1**: Approximately 12 jobs would be indirectly created by operation and maintenance of the Project.
- **Phase 2:** Approximately 9 to 10 jobs would be indirectly created by operation and maintenance of the Project.

The following details the IMPLAN estimates for induced job creation by Project phase:

- **Phase 1**: Approximately nine jobs would be indirectly created by operation and maintenance of the Project.
- **Phase 2**: Approximately seven jobs would be indirectly created by operation and maintenance of the Project (Horse Heaven Wind Farm, LLC 2021).

Economic Conditions

Fiscal Impact

The fiscal impact analysis prepared as part of the ASC estimated local tax revenues that would be expected to accrue as a result of the Project's construction.

Property Tax

The parcels that make up the Lease Boundary fall within several different Tax Areas. The ASC states that in 2020, the most common rate (i.e., millage (mill) or levy) identified for the parcels that make up the Lease Boundary was 11.49 mills. The average tax rate for the parcels within the Lease Boundary is very similar to the

Tax Area and county averages. The property tax estimates presented in the ASC used the 2020 Benton County average rate of 11.40 mills to estimate potential property tax revenues based on the estimated installed cost of the Project by phase. Estimated Project-related property tax revenues are assumed to be “add-ons” to existing levy amounts and would represent increases above current levels.

Property tax revenues are estimated for each phase for the first year of operation. Total property tax revenues are also estimated for the assumed 35-year operating life of the Project. The assessed values of the Project phases over this period are estimated based on the installed cost, average mill rate, and Washington Department of Revenue 2021 Personal and Industrial Property Valuation Guidelines (Horse Heaven Wind Farm, LLC 2021). The estimated property taxes that the Applicant would owe during operations are summarized as follows:

- **Phase 1**: Phase 1 would generate an estimated $10.4 million in property taxes in its first year of operation. This estimated total is equivalent to approximately 4.1 percent of the total property tax revenues generated in Benton County in 2020 (Horse Heaven Wind Farm, LLC 2021).
  - Over the 35-year operating life of the Project, Phase 1 would generate an estimated $140.6 million in total property tax revenues.
  - Viewed in dollar terms, Phase 1 during its first year of operation would generate approximately $6.1 million in school-related tax revenues, with $3.4 million of this total paid directly to local school districts.
  - The next largest share of property tax revenues would go to fire districts (14 percent), followed by roads (12 percent).
- **Phase 2**: Phase 2 would generate an estimated $9.0 million in property taxes in its first year of operation. This estimated total, which is the same for both Phases 2a and 2b, is equivalent to approximately 3.5 percent of the total property tax revenues generated in Benton County in 2020 (Horse Heaven Wind Farm, LLC 2021). The property tax revenues paid by the Applicant under the Phase 2 scenario may be summarized as follows:
  - Over the 35-year operating life of the Project, Phase 2a would generate an estimated $122.3 million in total property tax revenues.
  - The estimated total generated under Phase 2b over the same 35-year period would be $121.7 million.
  - Viewed in dollars terms, Phase 2 combined would generate approximately $5.3 million in school-related tax revenues, $2.9 million of which would be paid directly to local school districts (Horse Heaven Wind Farm, LLC 2021).

Under RCW 84.34, land classified as farm and agricultural land can receive tax relief from property taxes. Under Phase 2a, construction of the solar component of the Project would result in additional property tax revenue for Benton County as the land would be taken out of production. This potential source of revenue would only occur under Phase 2a because Phase 2b does not include solar facilities (Horse Heaven Wind Farm, LLC 2021).

Economic Output

Estimated indirect and induced impact estimates include the impacts of Project-related lease payments to participating landowners, including the Washington Department of Natural Resources.

The IMPLAN estimated total jobs and income are summarized below:

- **Phase 1**: Overall, operation of Phase 1 is estimated to support approximately 32 total (direct, indirect, and induced) jobs in Benton and Franklin Counties and approximately $2.4 million in labor income, with total economic output of approximately $5.5 million. These estimated annual impacts are expected to occur each year that the Project operates.
- **Phase 2**: Overall, operation of Phase 2 (if both Phase 2a and 2b are constructed) is estimated to support approximately 24 to 26 total (direct, indirect, and induced) jobs in Benton and Franklin Counties and approximately $1.8 million to $2.1 million in labor income, with total economic output of approximately $4.1 million to $5.2 million (Horse Heaven Wind Farm, LLC 2021).

Housing

As indicated in **Table 3** in **Appendix 4.16-1**, the Proposed Action would generate or support up to 58 FTEs. Based on the availability of housing within the study area (see Table 3.16-7 in Section 3), the Project's operations stage is anticipated to result in a negligible, long-term, feasible, regional impact on housing availability. An adverse impact on housing availability would occur only if workers have to relocate to the study area.

Analysis of Project impacts on housing during operation, and impact ratings for this topic, are informed by all phases of Project operations combined.

Environmental Justice

The analysis of impacts that the Project's operations stage (i.e., Phase 1, 2a, and 2b combined) would have on people of color minority and low-income communities incorporates the impact rankings from Section 4.3, Air Quality; Section 4.11, Noise and Vibration; and Section 4.14, Transportation.

Based on the IMPLAN model (**Appendix 4.16-1**), it is anticipated that by increasing property tax revenue and payroll income locally, the Project would not result in adverse economic impacts on people of color and low-income communities. For example, Project-generated property tax revenues would go directly to the school districts and fire stations that service communities that intersect with the Lease Boundary.

As indicated in Sections 4.3, Air Quality; 4.10, Visual Aspects, Light and Glare; 4.11, Noise and Vibration; 4.12, Recreation; and 4.14, Transportation, the Project would adversely impact the communities that intersect the Lease Boundary and study area including people of color and low-income communities. Examples of adverse impacts on these communities that are anticipated to result from the Project's operations stage include the following:

- Driving on gravel roads to service Project components would generate fugitive dust (Section 4.3, Air Quality).
- Turbines could obstruct views from residences or views of or from recreation resources (4.10, Visual Aspects, Light and Glare; Section 4.12, Recreation).
- Noise levels at the closest residences would be at or near the WAC nighttime noise limit of 50 A-weighted decibels (Section 4.11, Noise and Vibration).
- The Project would add 16 to 20 vehicle trips per day to the O&M facilities, with an additional 35 trips per day during periods of panel washing (Section 4.14, Transportation).

While impacts from operation of the Project are anticipated to be negligible on air quality (Section 4.3), low on transportation (Section 4.14), and medium on noise and recreational sites (Sections 4.11 and 4.12), impacts are anticipated to be medium to high on visual aspects during operation of the Project (Section 4.10).

Impacts from operation of the Project on all people that intersect the Lease Boundary and study area, including people of color and low-income in those communities, would be negligible to medium in magnitude, long term due to the potential for impacts to occur during the entire operations stage, feasible to unavoidable, and confined in spatial extent.

Operation of the Project would not disproportionately impact potential people of color or low-income communities because:

- The Project Lease Boundary and study area span multiple communities, the majority of which are not communities of low-income or people of color.
- The communities (i.e., census block groups) that were identified as communities of low income or people of color, have low populations and dispersed urban development within large-size census areas, mainly in areas further away from the project area.
- The communities within the Lease Boundary and near the Lease Boundary have a combined low income population and a combined people of color population that are very similar to those of the reference community (Benton County).
- The communities that were identified as communities of low income or people of color are not at greater risk of impacts from other environmental stressors (i.e., proximity to traffic, superfund sites, hazardous waste, facilities).
- The majority of the identified viewpoints (selected residences or recreation sites) that are anticipated to experience high impacts relating to visual aspects, during the operation of the Project, are located within areas outside of the identified communities of low income or people of color.

4.16.2.3 Impacts during Decommissioning

Impacts on housing availability for residents within the study area during the decommissioning stage would be similar to those described for the Project's construction stage. The analysis of Project-related impacts on housing during decommissioning, and impact ratings for this topic, are informed by consideration of combined decommissioning activities. Based on the Applicant's acknowledgment that the majority of workers would be sourced locally, and on the availability of short-term and long-term rentals throughout the study area, the decommissioning stage is anticipated to result in a negligible, temporary to short term, feasible, regional impact on housing availability. Adverse impacts would occur if a reduction in short-term and long-term rentals were to reduce supply to the point that it caused an increase in rental prices.

Decommissioning of the Project would generate economic benefits in the regional economy through direct expenditures for materials and services, as well as new payroll income. However, it is anticipated that Project decommissioning would impact tax revenues and, as a result, general wellbeing. Therefore, in addition to impacts on housing and people of color and low-income populations (the two topics analyzed for construction and operation stages of the Project), analysis of decommissioning-related impacts includes analysis impacts on wellbeing.

Decommissioning of the Project would result in lower property tax revenues for Benton County and the Tax Area as the Project's added value would be removed from the parcels that make up the Lease Boundary's valuation. For example, smaller collections would impact operational budgets for schools, school districts, and fire stations within Benton County and the Tax Area. The loss of property tax revenue from decommissioning would result in a medium, long-term, feasible, and regional impact on the study area's economic condition.

Environmental Justice

Similar to the impacts described for construction, the analysis of air quality, visual aspects, noise, increased transit times, and availability of affordable housing indicates that Project decommissioning would adversely impact people of color and low-income communities that intersect the Lease Boundary.

Impacts from the combined decommissioning of the Project on all people that intersect the Lease Boundary and study area, including people of color and low-income communities would be negligible to medium in magnitude, temporary to long term due to the potential for impacts to occur during the entire decommissioning stage and beyond, feasible to unavoidable, and regional in spatial extent. For instance, smaller collections would impact operational budgets for schools, school districts, and fire stations that service all people that intersect the Lease Boundary and study area, including people of color and low-income communities that intersect the Lease Boundary and study area.

Decommissioning would not disproportionately impact potential people of color or low-income communities, because:

- The Lease Boundary and study area span multiple communities, the majority of which are not communities of low income or people of color.
- The communities within the Lease Boundary and near the Lease Boundary have a combined low income population and a combined people of color population that are very similar to those of the reference community (Benton County).
- The communities (e.g., census block groups) that were identified as communities of low income or people of color have low populations and dispersed urban development within large census areas, in areas further away from the Project.
- The communities that were identified as communities of low-income or people of color are not in greater risk of impacts from other environmental stressors (i.e., proximity to traffic, superfund sites, hazardous waste facilities).

4.16.2.4 Applicant Commitments and Identified Mitigation

This section describes the measures that would reduce or compensate for impacts related to socioeconomics from construction, operation, and decommissioning of the Project. These measures would be implemented in addition to compliance with the environmental permits, plans, and authorizations required for the Proposed Action.

Applicant Commitments

The Applicant has identified measures and/or best practices that are designed to prevent or minimize potential impacts on the affected environment for the Project. Measures presented by the Applicant in the ASC (Horse Heaven Wind Farm, LLC 2021) and taken into consideration in the characterization of potential impacts on socioeconomics are discussed in Section 2.3 and listed below.

- Applicable commitment measures outlined in Sections 4.3, Air Quality; 4.10, Visual Aspects, Light and Glare, 4.11, Noise and; and 4.14, Transportation.

- The Project would be developed under a community workforce agreement or project labor agreement.

Recommended Mitigation Measures

In addition to mitigation measures detailed in Sections 4.3, Air Quality; 4.11, Noise; and 4.14, Transportation, the Washington Energy Facility Site Evaluation Council has identified the following additional and modified mitigation measure for the Project to avoid and/or minimize potential impacts on socioeconomics:

Socio-ec-1[40]: Prior to decommissioning, the Applicant would provide a new housing analysis that would include up-to-date housing information to determine if current socioeconomic analysis and Project impacts on housing are appropriate or if additional mitigation is needed to address temporary housing availability.

4.16.2.5 Significant Unavoidable Adverse Impacts

Determining the significance of an impact involves context and intensity, which, in turn, depend on the magnitude and duration of an impact. "Significant" in the Washington State Environmental Policy Act means a reasonable likelihood of more than a moderate adverse impact on environmental quality. An impact may also be significant if its chance of occurrence is not great, but the resulting environmental impact would be severe if it occurred (WAC 197-11-794).

This Draft EIS weighs the potential impacts on socioeconomics that may result from the Proposed Action with mitigation and makes a resulting determination of significance for each impact in **Tables 4.16-4a, 4.16-4b, and 4.16-4c**.

[40] Socio-ec-: Identifier of numbered mitigation item for Socioeconomics

Table 4.16-4a Summary of Potential Impacts on Socioeconomics during Construction of the Proposed Action

Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact: ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact: ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact: ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact: ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Housing Availability	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Phase 1 is anticipated to directly support an average monthly workforce of 300, and Phases 2a and 2b are anticipated to support an average monthly force of 267 and 271, respectively. The majority of construction workers would be sourced locally; however, the Project's construction would require the temporary and short-term relocation of non-local construction workers into the region. As reported in the 2019 American Community Survey 5-Year Estimate, rental vacancy rate in Benton County was 5.1%, with 1,660 units available for rent.	Negligible	Temporary to Short Term	Feasible	Regional	No mitigation identified	None identified
People of Color and Low-Income Populations	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Disproportionate impacts on people of color and low income communities.	Negligible	Short Term	Unlikely	Confined to Regional	No mitigation identified	None identified

Notes:
Source: American Community Survey (2019) 5-Year Estimate Data (U.S. Census Bureau 2020)
Source: Horse Heaven Windfarm, LLC 2021
(a) The impacts related to each component, including "comprehensive Project," were rated separately; components were combined in the same cell if they received the same impact ratings for the identified topic.
(b) Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.
(c) Mitigation measures listed here are additional actions that EFSEC could impose to further reduce the impacts. See Section 4.1 Introduction for details.
(d) Significant unavoidable impacts are those that would remain even after all identified additional mitigation measures have been required by EFSEC.
BESS = battery energy storage system; EFSEC = Washington Energy Facility Site Evaluation Council

Table 4.16-4b Summary of Potential Impacts on Socioeconomics during Operation of the Proposed Action

Topic	Component[a]	Description of Impact[b]	Magnitude of Impact: ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact: ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact: ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact: ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[c]	Significant Unavoidable Adverse Impacts[d]
Housing Availability	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	The Proposed Action would generate or support up to 58 FTEs. A team of 16 to 20 personnel would be employed to operate and maintain Project components. As reported in the 2019 American Community Survey 5-Year Estimate, rental vacancy rate in Benton County was 5.1%, with 1,660 units available for rent.	Negligible	Long Term	Feasible	Regional	No mitigation identified	None identified
People of Color and Low-Income Populations	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Disproportionate impacts on people of color and low income communities.	Negligible	Long Term	Unlikely	Confined	No mitigation identified	None identified

Notes:
(a) The impacts related to each component, including "comprehensive Project," were rated separately; components were combined in the same cell if they received the same impact ratings for the identified topic.
(b) Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.
(c) Mitigation measures listed here are additional actions that EFSEC could impose to further reduce the impacts. See Section 4.1 Introduction for details.
(d) Significant unavoidable impacts are those that would remain even after all identified additional mitigation measures have been required by EFSEC.
BESS = battery energy storage system; EFSEC = Washington Energy Facility Site Evaluation Council; FTE = full-time equivalent

Table 4.16-4c Summary of Potential Impacts on Socioeconomics during Decommissioning of the Proposed Action

Topic	Component[(a)]	Description of Impact[(b)]	Magnitude of Impact: ▪ Negligible ▪ Low ▪ Medium ▪ High	Duration of Impact: ▪ Temporary ▪ Short Term ▪ Long Term ▪ Constant	Likelihood of Impact: ▪ Unlikely ▪ Feasible ▪ Probable ▪ Unavoidable	Spatial Extent or Setting of Impact: ▪ Limited ▪ Confined ▪ Local ▪ Regional	Mitigation[(c)]	Significant Unavoidable Adverse Impacts[(d)]
Housing Availability	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	The majority of construction workers would be sourced locally; however, the Project's construction would require temporary and short-term relocation of construction workers into the region.	Negligible	Temporary to Short Term	Feasible	Regional	**Socio-ec-1:** Updated housing analysis to confirm temporary or short-term availability	None identified
Wellbeing	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Decommissioning of the Project would restore property tax revenues for Benton County and the Tax Area to pre-Project conditions as the Project's added value would be removed from the parcels that make up the Lease Boundary's valuation. For example, smaller collections would impact operational budgets for schools, school districts, and fire stations within Benton County and the Tax Area.	Medium	Long Term	Feasible	Regional	No mitigation identified	None identified
People of color and Low-Income Populations	Turbine Option 1 Turbine Option 2 Solar Arrays BESSs Substations **Comprehensive Project**	Disproportionate impacts on people of color and low income communities.	Negligible	Temporary to Long Term	Unlikely	Regional	No mitigation identified	None identified

Notes:
(a) The impacts related to each component, including "comprehensive Project," were rated separately; components were combined in the same cell if they received the same impact ratings for the identified topic.
(b) Design features, best management practices, and other actions proposed by the Applicant to avoid or minimize environmental impacts were assumed to be part of the Proposed Action and were taken into account when identifying the impacts.
(c) Mitigation measures listed here are additional actions that EFSEC could impose to further reduce the impacts. See Section 4.1 Introduction for details.
(d) Significant unavoidable impacts are those that would remain even after all identified additional mitigation measures have been required by EFSEC.
BESS = battery energy storage system; EFSEC = Washington Energy Facility Site Evaluation Council

4.16.3 Impacts of No Action Alternative

Under the No Action Alternative, impacts related to socioeconomics from the construction, operation, and decommissioning of the Proposed Action would not occur. For the purpose of this analysis, it is assumed that no future development would occur within the Lease Boundary.

This Page Intentionally Left Blank

5.0 CHAPTER 5 – CUMULATIVE IMPACTS

When impacts are assessed for an individual proposed action, they may be determined less than significant, but when considered collectively (cumulatively) with the impacts of other actions, especially over a period of time, they can be significant (40 Code of Federal Regulations 1508.7). The Washington State Environmental Policy Act (SEPA) requires that agencies address cumulative impacts. Cumulative impacts are the combined result of incremental direct and indirect impacts on resources from a project or plan, past and present actions, and other reasonably foreseeable developments (RFDs). RFDs generally include actions that are currently underway, formally proposed or planned, or highly likely to occur based on available information (Ecology 2018).

Environmental Resources that are susceptible to cumulative impacts include, but are not limited to, soil, water, air, biological resources, and cultural resources. Construction activities and facility operations, in particular, have the potential to contribute to cumulative impacts on susceptible resources. For example, a cumulative impact would occur if increased runoff and contaminants from construction were added to the volumes and levels of contamination from similar development projects surrounding the same wetland This analysis of cumulative impacts addresses environmental resources, such as housing, discussed in the Socioeconomics section in 3.16 and 4.16, but does not include an evaluation of other non-SEPA topics discussed in the Socioeconomics section.

5.1 Project Characteristics

Horse Heaven Wind Farm, LLC (Applicant) has proposed the Horse Heaven Wind Farm (Project, or Proposed Action), a renewable energy generation facility located in the Horse Heaven Hills area of Benton County, Washington. The Project would have a nameplate generating capacity of up to 1,150 megawatts (MW) utilizing both wind turbines and solar photovoltaic panels to convert energy from the wind and sun into electric power. The power would then be either directly transferred to the electric power grid or stored on up to three battery energy storage systems (BESSs).[1] The number of turbines and the extent of solar arrays used for the Project would depend on the final turbine models and solar modules selected and the final array layout chosen but would not total more than 244 turbines or three solar arrays.

The Applicant has executed a lease agreement with landowners to establish a Lease Boundary. Within the Lease Boundary, the Applicant intends to construct turbines, solar arrays, and associated facilities. Chapter 2, Figure 2-1, shows the Lease Boundary location, which encompasses approximately 72,428 acres. The Project's Wind Energy Micrositing Corridor encompasses 11,850 acres and consists of the areas where the turbines and supporting facilities would be sited during the Proposed Action's final design. Within the Solar Siting Areas, there are three areas under consideration for the proposed solar arrays. Figure 2-2 illustrates the Solar Siting Areas and the three areas under consideration. The Solar Siting Areas encompass 10,752 acres. The Micrositing Corridor and the Solar Siting Areas are larger than the Project's final disturbance footprint. This would allow minor rerouting to optimize the design and minimize impacts to sensitive resources discovered during the final design and pre-construction process.

5.2 Analysis of Cumulative Impacts

Cumulative impacts result from spatial and temporal crowding of environmental disturbances. One way to determine the appropriate geographical boundaries for determining cumulative impacts is to consider the distance an impact can travel. For instance, a cumulative impact analysis of air emissions would need to consider impacts

[1] The Applicant indicated in the Application for Site Certification (ASC) that there is the potential for fewer than three BESS to be constructed but has requested analysis for all the components and distinct parts as presented in Table 2.1-1 of the ASC.

on air quality regionally as opposed to locally due to their mobility. For water, an appropriate boundary may be a river basin or a watershed. Similarly, when evaluating for socioeconomics, visual, or cultural and historic resources, it might be necessary to consider impacts on a community or regional basis (CEQ 1997).

Information about direct and indirect impacts of past and present actions is useful in identifying and predicting the level of impact a proposed action might have on the natural or built environment. However, the impacts of past actions may have no cumulative relationship to the impacts of a proposed action. To fully evaluate cumulative impacts, it is necessary to assess the type and extent of a proposed action's impacts and how the project and its alternatives would add to, modify, or mitigate impacts from past actions. In accordance with Council on Environmental Quality (CEQ) guidance, this cumulative impacts analysis focuses on the current aggregate impacts of past actions without delving into the historical details of individual past projects (CEQ 2005).

Although no adverse impacts were identified for the No Action Alternative in Chapter 4, this evaluation of cumulative impacts includes an analysis of what would likely occur if the proposed project is not constructed and operated. The identification of cumulative impacts for the No Action Alternative establishes the effect that Past and Present Actions and RFDs have had or would have on the environmental setting without the incremental addition of the Proposed Action.

5.2.1 Methods

The analysis of cumulative impacts for the Proposed Action used the following steps to evaluate past and present actions and RFDs:

1) Initial scoping, or identification of projects, to consider for a cumulative impacts analysis

2) An analysis of project characteristics determined if the projects should be carried forward to a cumulative impacts analysis

3) An analysis of cumulative impacts that includes the Proposed Action, the past and present actions and RFDs identified during the initial scoping (Step 1) and preliminary cumulative impacts analysis (Step 2)

5.2.1.1 Step 1: Initial Scoping

Geographic boundaries and time periods used in cumulative impact analyses should be based on the following:

- Resources that are susceptible to cumulative impacts (also known as resources of concern)
- All actions that may contribute to cumulative impacts (EPA 1999)

The CEQ guidance on cumulative impacts analysis states that scoping for applicable past and present actions and RFDs should focus on projects that impact resources similar to those impacted by the proposed action (CEQ 2005). The CEQ states that agencies should exercise discretion in determining whether, and to what extent, information about the specific nature, design, or present effects of a past action is useful for the agency's analysis of the impacts of a proposed action (CEQ 2005).

Identification of Spatial Boundaries

When considering the impacts of past and present actions and RFDs in combination with the impacts of a proposed action, the analysis of cumulative impacts may require an expansion of the spatial limits beyond the boundaries used for the analysis of direct and indirect impacts. The spatial boundaries for this cumulative impact analysis are feasible and consistent with the resources of the natural and human environment. Within the maximum geographical range used for this cumulative impacts analysis, each resource would likely have its own spatial boundaries.

Identification of Temporal Boundaries

Determining the temporal boundaries for a cumulative impacts analysis requires estimating the length of time the impacts of a proposed action would occur. Within the maximum temporal boundary, each resource may have its own temporal boundary that would be less than the upper range stated for the proposed action. The length of time extends for as long as the impacts of a project might contribute to impacts on resources that are susceptible to cumulative impacts (EPA 1999). The duration of direct and indirect impacts of the Proposed Action would begin at the start of the construction phase and extend through operations and potentially beyond decommissioning and restoration. For this Project, the temporal boundaries would exceed the 30- to 35-year life expectancy of the Proposed Action.

Identification of Applicable Past and Present Actions and Reasonably Foreseeable Developments

The following discussion presents the criteria used in selecting past and present actions and RFDs for evaluation of cumulative impacts.

This assessment of cumulative impacts started with a scoping analysis that identified potential projects for evaluation. The scoping analysis included a review of energy projects (e.g., renewable and conventional) and non-energy projects, alike. Non-energy projects include transportation improvements, industrial facilities, redevelopment programs, and transmission line installations.

The scoping analysis and selection of past and present actions and RFDs extended beyond the Lease Boundary to include human communities and neighboring jurisdictions, various rural and urban landscapes, watersheds, and airsheds. The setting for the scoping analysis and selection of projects for cumulative impacts evaluation was established in accordance with U.S. Department of Energy and Washington Department of Transportation guidance on evaluating cumulative impacts (USDOE 2021; WSDOT 2022). The cumulative impacts scoping analysis used the following criteria to identify applicable past and present actions and RFDs:

- State and local agency implementation plans and databases of proposed actions (e.g., Statewide Transportation Improvement Programs, Benton County SEPA registry, etc.) were reviewed for applicable RFDs. Upon identification of potential projects within the online resources, the scoping analysis applied the following criteria to determine if an RFD would be carried forward into the preliminary cumulative impacts analysis:
  - The RFD's funding source was clearly identified.
  - The RFD was located within Benton County, Washington's, geographical boundaries.
- A desktop review of temporally and spatially relevant past and present actions and RFDs located within southeastern Benton County, Washington, that would have the potential to impact resources similar to those impacted by the Proposed Action. If an applicable past or present action or RFD was identified through the desktop review process, it was considered for inclusion in the preliminary cumulative impacts scoping analysis if it met the following criteria:
  - Its construction and operation were, are, or would be similar to the Proposed Action.
  - It is or would be located in a neighboring jurisdiction.

RFDs identified during the desktop review were considered for analysis if they were undergoing a federal, state, or local agency permitting process, and the agency has publicly noticed the pending action.

- To identify past and present actions and RFDs similar to the Proposed Action beyond the jurisdictional boundaries of southwest Benton County, the scoping analysis included a review of the following:
  - Federal, state, and local agency databases
  - Public and private utility providers
  - An online search for perspective energy development projects

  An RFD located beyond the local jurisdictional boundaries was considered for preliminary cumulative impacts analysis if it had received a federal, state, or local permit but construction had not started. Websites of relevant agencies with permitting authority over energy facility projects were reviewed to determine if any permits had been recently issued but construction had not started.

A full list of sources used to identify projects for the cumulative impacts analysis is included in Chapter 6 References.

5.2.1.2 Step 2: Preliminary Cumulative Impacts Analysis

Table 5-1 provides a summary of existing projects and RFDs geographically and temporally relevant to the Proposed Action, their characteristics, and potential resources susceptible for being cumulatively impacted. **Table 5-1** also presents a list of primary resources that would likely be impacted by the past and present actions and RFDs and the Proposed Action. Preparation of the Final Environmental Impact Statement (EIS) would involve a review and potential updating of projects included in **Table 5-1**. **Figure 5-1** presents the location of the identified existing projects and RFDs. The following discussion provides the rationale for including and excluding existing projects and RFDs identified during Step 1, the preliminary cumulative impacts scoping analysis in this evaluation of cumulative impacts.

Rationale for Inclusion

The following criteria were applied to existing projects and RFDs across the region to compile a list of projects whose effects may combine with the impacts of the Proposed Action to further stress resources of concern or have the potential to create new resources of concern:

- Potential past and present actions or RFDs in the same geographic area that share resources in common with the Proposed Action. This analysis deemed 30 miles to be the absolute maximum upper geographic threshold for the inclusion of renewable energy projects and 20 miles for the inclusion of roadway and commercial and industrial projects. Projects that may share or impact the same resources include the following:
  - Wind farms
  - Solar farms
  - Energy storage facilities
  - Transmission line improvements
  - Roadway projects
  - Commercial or industrial developments

- Projects that have the potential to cause a migration of contaminants beyond their boundaries. For example, these existing projects or RFDs that could potentially affect air quality or water quality locally or on a regional basis
- Projects that, together with the Proposed Action, could result in a fragmenting of habitat
- Projects that could cause changes in land use or historic character through residential, commercial, or industrial development

Rationale For Exclusion

The following criteria were applied to past and present actions and RFDs from across the region to exclude them from this cumulative impacts analysis:

- Projects that lack affected resources similar to those that would be affected by the Proposed Action.
- Projects that are located beyond the distance thresholds for inclusion.
- Presence of a significant geographic feature or land use feature that occurs between the past or present action or RFD, and the Proposed Action, that would prevent a nexus of impacts and resources. A significant geographic feature or land use would be a major topographical feature, a large body of water, or a large urban community or multiple smaller communities.

5.2.1.3 Step 3: Cumulative Impacts Analysis

Impacts of Proposed Action and Existing or Reasonably Foreseeable Developments

When combined with other actions affecting the natural and built environment, the activities addressed by this Draft EIS could lead to cumulative impacts. The scale of those cumulative impacts depends on the project and the sensitivity of resources susceptible to cumulative impacts. **Table 5-2** provides an analysis of impacts from the Project and cumulative impacts from the Proposed Action and past and present actions and RFDs. If it is determined that the Proposed Action would considerably contribute in a distinctive manner or a noticeably measurable way to cumulative impacts to a resource topic within the applicable spatial and temporal setting, an additional discussion of cumulative impact specific to the resource and the Washington Energy Facility Site Evaluation Council's (EFSEC's) determination of significance is presented in Section 5.2.2.

This Page Intentionally Left Blank

Table 5-1: Existing and Reasonably Foreseeable Developments Included in the Cumulative Impact Analysis

Project	Description	Distance from Proposed Action (miles)	Construction Date and Operations Timeframe of Past and Present Actions	Anticipated Date for RFD Construction	Primary Resources in Common with the Proposed Action
Agrium U.S.	Agrium U.S. employs approximately 120 people at the Kennewick branch location and is engaged in chemical manufacturing activities at this facility. Agrium U.S. maintains a Title 5 Air Quality Permit.	3.2	Operated since 1959 with various facility expansions and closures.	Not Applicable	Air Quality, Water Resources, Energy and Natural Resources
Stateline Wind Project	This project is a wind energy facility consisting of two units—Stateline 1 & 2 and Vansycle II. Stateline 1 & 2 is composed of 186 wind turbines and has a peak generating capacity of up to 123 MW. Vansycle II consists of 43 wind turbines with a peak generating capacity of 99 MW.	12.6	Stateline was built in multiple phases between the years 2001 and 2002; Vansycle II was constructed in 2009.	Not Applicable	Wildlife, Habitat, and Visual and Aesthetics
Nine Canyon Wind Project	Constructed in three phases between 2002 and 2008, this project includes 63 wind turbines with a maximum generating potential of 95.9 MW of electricity. Phases I and II included a total of 49 turbines, each capable of producing 1.3 MW. The third phase expansion began in September 2007 and was completed in 2008. The third phase added 14 larger turbines, each capable of producing 2.3 MW of power.	0.5	Constructed in three phases between 2002 and 2008.	Not Applicable	Wildlife, Habitat, and Visual and Aesthetics
Port of Kennewick's Vista Field Redevelopment Project	The Port of Kennewick would sell or lease parcels and then use those proceeds to fund each phase of infrastructure until all 103 acres are developed. At full build-out, Vista Field is expected to add 750,000 square feet of retail, office, service, and entertainment and fulfill 1% of the region's anticipated growth over the next 20 years.	6.5	The official groundbreaking occurred in 2019. The Grand Opening for the initial phase would occur in June 2022.	Not Applicable	Public Services and Utilities, Earth Resources, Water Resources, and Air Quality
City of Kennewick & Port of Kennewick - Clover Island Shoreline Transformation	This project would use a portion of the City of Kennewick's Rural County Capital Fund allocated funding to improve public infrastructure and prepare commercial building sites in the form of shoreline stabilization, extension of certain utilities, construction of trails, installation of drainage infrastructure, and landscaping. The Clover Island Shoreline Transformation would support the shovel-ready preparation of three parcels owned by Port of Kennewick totaling 3.24 developable and marketable acres on Clover Island for food service, lodging, tourism, and other related businesses.	6.8	Contracts were issued for development in 2021.	In-Progress	Public Services and Utilities, Earth Resources, Water Resources, and Air Quality
City of Kennewick & Port of Kennewick - Columbia Gardens Phase 1	The intent of Columbia Gardens Phase 1 is to provide space for restaurants, wine tasting rooms, and other related businesses. This project would construct public infrastructure (extension of water, sewer, electrical and effluent utilities) and roads, storm drainage, lighting, landscaping, and parking areas to support the Port's construction of two buildings on a 6-acre site. The Columbia Gardens project is expected to result in more than 100 permanent jobs.	6.5	Project approved by Benton County Board of County Commissioners in 2017.	Not Applicable	Earth Resources, Water Resources, Air Quality, and Public Services and Utilities

Table 5-1: Existing and Reasonably Foreseeable Developments Included in the Cumulative Impact Analysis

Project	Description	Distance from Proposed Action (miles)	Construction Date and Operations Timeframe of Past and Present Actions	Anticipated Date for RFD Construction	Primary Resources in Common with the Proposed Action
County Well Road-Phase I State Road 221 to McBee (3.0 miles)	County Well Road - Phase I is included in Benton County's Six-Year Transportation Implementation Plan for 2021–2026. Portions of County Well Road intersect the Lease Boundary. County Well Road extends more than 7 miles in Benton County, Washington. Classified as a rural minor collector by the Washington State Department of Transportation the road sees heavy truck traffic during the farming season. This project is the first phase of a three-part series that would reconstruct nearly 7 miles of the road to an all-weather standard and work to improve safety and drainage.	0	County Well Road - Phase I is included in Benton County's Six-Year Transportation Implementation Plan for 2021–2026.	Estimated timeframe 2022–2026	Earth Resources, Water Resources, Vegetation, Air Quality, Wildlife and Habitat, and Transportation
County Well Road - Phase II McBee to Clodius (2.0 miles)	This project is the second phase of a three-part series that would reconstruct nearly 7 miles of the road to an all-weather standard and work to improve safety and drainage.	0	County Well Road - Phase II is included in Benton County's Six-Year Transportation Implementation Plan for 2021–2026.	Estimated timeframe 2022–2026	Earth Resources, Water Resources, Vegetation, Air Quality, Wildlife and Habitat, and Transportation
County Well Road-Phase III Clodius to County Pit (1.8 miles)	This project is the final phase of a three-part series that would reconstruct nearly 7 miles of the road to an all-weather standard and work to improve safety and drainage.	0	County Well Road - Phase III is included in Benton County's Six-Year Transportation Implementation Plan for 2021–2026.	Estimated timeframe 2022–2026	Earth Resources, Water Resources, Vegetation, Air Quality, Wildlife and Habitat, and Transportation
Finley Road Mile Post 5.2 to End of Pavement (2.1 miles)	The Finley Road project would improve 2.1 miles of gravel Finley Road to a paved, all-weather standard and establish proper widths.	2.4	Finley Road is included in Benton County's Six-Year Transportation Implementation Plan for 2021–2026.	Estimated timeframe 2022–2026	Earth Resources, Water Resources, Vegetation, Air Quality, Wildlife and Habitat, and Transportation
Dague Road Terrill to Game Farm (0.5 miles)	Dague Road is a proposed 0.5-mile, paved, all-weather road that would connect E Game Farm Road to East Terrill Road in Finely, Washington, southeast of Kennewick.	2.0	Dague Road is included in Benton County's Six-Year Transportation Implementation Plan for 2021–2026.	Estimated timeframe 2022-2026	Earth Resources, Water Resources, Vegetation, Air Quality, Wildlife and Habitat, and Transportation

Sources: See Chapter 6, References – Sources of Cumulative Impact Projects
MW = megawatts; RFD = reasonably foreseeable development

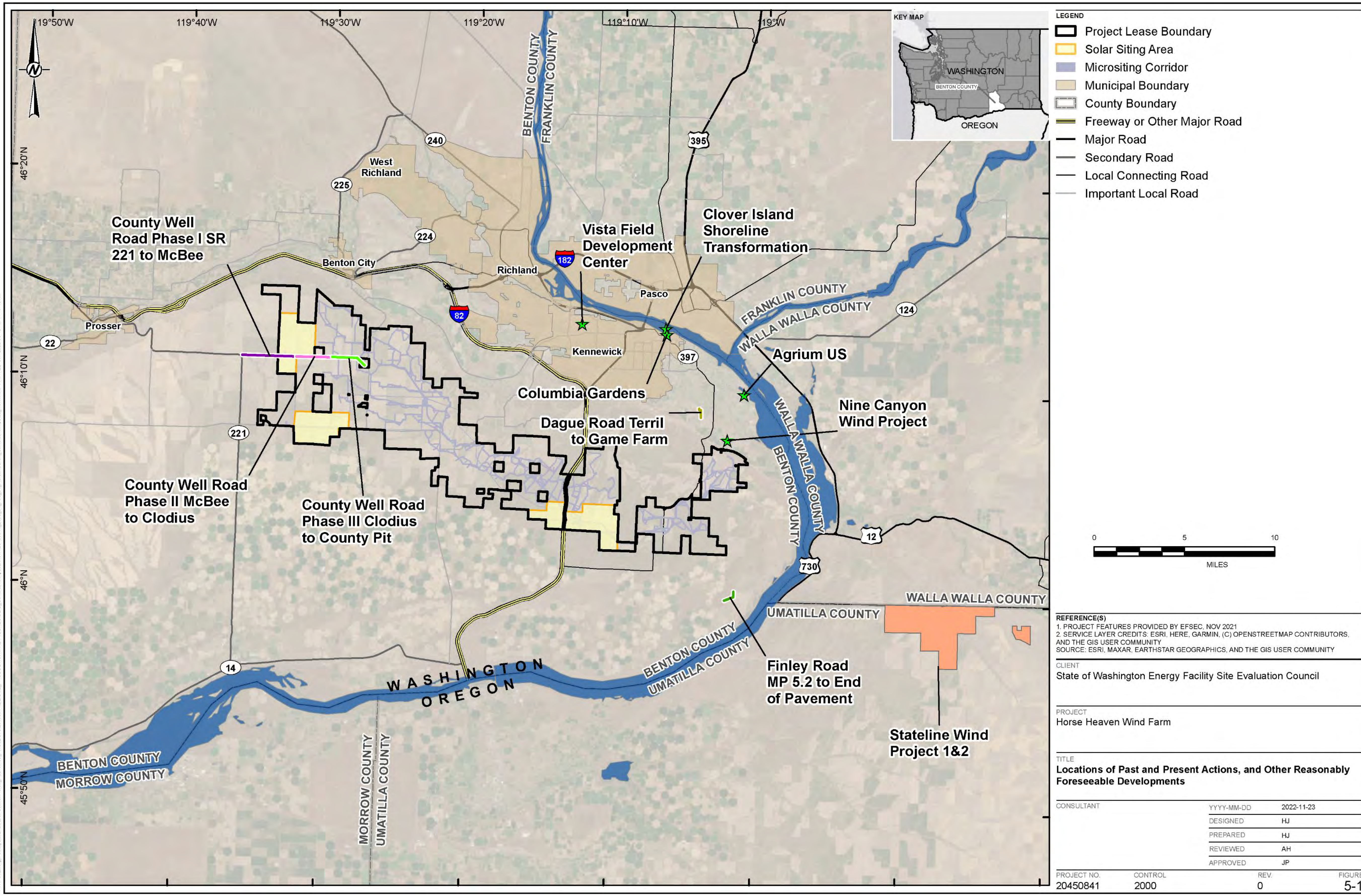


Figure 5-1: Location of Past and Present Actions, and Other Reasonably Foreseeable Developments

Table 5-2: Cumulative Impacts with Proposed Action

Resource	Impacts from Proposed Action Alone	Cumulative Impacts from the Proposed Action and Past and Present Actions and RFDs
Earth	Geologic hazards, sedimentation, and fugitive dust	**From the Project:** Impacts on geology, soil, topography, and geologic hazards would occur because of constructing access roads, tower foundations, transformer pads, and other project facilities. **From Past and Present Actions and RFDs:** Impacts on earth resources from past and present actions and RFDs would be limited to localized, temporary erosion impacts from ground disturbance during construction. The impacts on soils would be within the construction footprint for the respective project; they would not geographically overlap each other. **Conclusion:** The Proposed Action does not meaningfully contribute to a cumulative impact on geologic hazards, sedimentation, and fugitive dust within the spatial and temporal setting.
Air Quality	Fugitive dust ($PM_{2.5}$ and PM_{10})	**From the Project:** Cumulative impacts on air quality in terms of $PM_{2.5}$ and PM_{10} are unlikely to occur because the relative contribution of emissions from the Project are extremely small in comparison to the regional emissions inventory. **From Past and Present Actions and RFDs:** Cumulative impacts on air quality in terms of $PM_{2.5}$ and PM_{10} are unlikely to occur because the relative contribution of emissions from the Project are extremely small in comparison to the regional emissions inventory. **Conclusion:** The Proposed Action does not meaningfully contribute to the overall cumulative impact on air quality within the spatial and temporal setting.
Water Resources	Change in surface water runoff or absorption, change in water quality, impacts on ephemeral and intermittent streams, impacts on floodplains	**From the Project:** Impacts from the construction and operation of the wind turbines, solar arrays, substations, BESSs, and transmission lines may result in impacts on ephemeral and intermittent streams, floodplains, surface water runoff and absorption capacity, and water quality. These impacts are anticipated to be temporary and localized. Potential impacts from decommissioning are not expected to be additive to impacts from past and present actions and RFDs and are therefore not expected to contribute to cumulative negative effects. **From Past and Present Actions and RFDs:** Impacts on water resources from past and present actions and RFDs are also anticipated to be limited to localized and temporary impacts and are not expected to result in cumulative impacts. **Conclusion:** The Proposed Action does not meaningfully contribute to cumulative impacts on water resources.
Vegetation	Loss of Priority Habitat, loss of other vegetated areas, and loss of suitable habitat for special status plant species	**From the Project:** Impacts from construction and operation of the wind turbines, solar arrays, substations, BESSs, transmission lines, roads (new and upgraded), and associated Project infrastructure, when combined with impacts from past and present actions and RFDs, would result in cumulative long-term loss of Priority Habitat and suitable habitat for special status plant species. The operation of the Project may also contribute to degradation of Priority Habitat and suitable habitat for special status plant species adjacent to Project infrastructure such as roads from invasive plants and dust. Potential impacts from decommissioning are not expected to be additive to impacts from past and present actions and RFDs and are therefore not expected to contribute to cumulative negative effects. **From Past and Present Actions and RFDs:** Past and present actions and RFDs located within Priority Habitat areas (e.g., Sagebrush shrub-steppe) would contribute to habitat loss and alteration. Similarly, loss of suitable habitat for special status plant species in the area would contribute to habitat fragmentation or isolation of populations. **Conclusion[a]: The Proposed Action would meaningfully contribute to cumulative impacts on Priority Habitat and special status plant species.**
Wildlife and Habitat	Loss of habitat, loss of habitat for special status wildlife, indirect loss of habitat through displacement and behavioral changes, mortality, barriers to movement	**From the Project:** Impacts from the construction and operation of the wind turbines, solar arrays, substations, BESSs, and transmission lines when combined with impacts from past and present actions and RFDs would result in cumulative long-term wildlife habitat loss (direct and indirect), and barriers to wildlife movement. Operation of the Project, particularly the wind turbines, may also, when combined with impacts from past and present actions and RFDs, contribute to the cumulative mortality of wildlife. Potential impacts from decommissioning are not expected to be additive to impacts from past, present, and RFDs and are therefore not expected to contribute to cumulative negative effects. **From and Past Present Actions, and RFDs:** Past and present actions and RFDs located on natural habitat (e.g., shrub-steppe) and modified habitat used by wildlife (e.g., agricultural lands) would contribute to the loss and alteration of wildlife habitat. Similarly, projects situated on natural habitat and linear projects (e.g., roadways) would contribute to habitat fragmentation and barriers to wildlife movement. Existing developments and RFDs, particularly wind power projects, would contribute to the mortality of local wildlife—notably, aerial species (birds and bats). **Conclusion[a]: The Proposed Action would meaningfully contribute to a cumulative impact on habitat loss and degradation, habitat loss for special status wildlife species, barriers to movement, and wildlife mortality.**
Energy and Natural Resources	Resource availability, disruption of supply chains	**From the Project:** The Project would require electricity, gasoline, and diesel fuel to power portable generators, construction vehicles, and other equipment required for development and operation of the proposed facility. Mineral and earth resources such as iron ore, gravel, and concrete would be required for development of the Proposed Action. These resources are readily available within Benton County, Washington State, and the United States. Existing supply chains are sufficient to meet the Proposed Action's current and future needs. **From Past and Present Actions and RFDs:** Commercial, industrial, and transportation projects listed in Table 5-1 would contribute to cumulative impacts to energy and natural resources because they would require similar resources for construction and operation as the Proposed Action. These projects would require mineral and earth resources, gasoline, and diesel fuel for construction and operations. These materials and energy sources are readily available throughout southeastern Benton County, Washington State, and the United States. **Conclusion:** If existing and future actions require energy and natural resources beyond what is currently available, modifications to supply chains and infrastructure would be altered to meet future demand. Therefore, the Proposed Action's requirements do not meaningfully contribute to a cumulative impact on availability of energy and natural resources within the spatial and temporal setting.

Table 5-2: Cumulative Impacts with Proposed Action

Resource	Impacts from Proposed Action Alone	Cumulative Impacts from the Proposed Action and Past and Present Actions and RFDs
Land and Shoreline Use	Agricultural productivity, profitability, and farm operations	**From the Project:** The Project would be located in an area zoned for agricultural activities. Additionally, the Project is in alignment with Benton County Code zoning ordinance Chapter 11.17.070 Growth Management Act Agricultural District – Uses Requiring a conditional use permit. This zoning ordinance allows commercial wind farms with approval of a conditional use permit issued by the Board of County Commissioners. During construction of the Project, the potential would exist for construction-related traffic, noise and vibration, and air emissions to result in some temporary cumulative impacts on agricultural production and farm profitability within the spatial setting. Mitigation measures identified by EFSEC would address impacts on farm profitability and operations. Additionally, lease payments provided to participating farmers and ranchers would have beneficial financial impacts on their agricultural businesses. During operation, the Project would be expected to operate consistent with local land use regulations and would not be expected to result in changes to land uses or development patterns different from those envisioned by Benton County's comprehensive land use plans. Mitigation measures and zoning ordinances would require that decommissioning of the proposed action be in alignment with the environmental setting. **From Past and Present Actions and RFDs:** The potential exists for the development of properties within the spatial setting to continue to occur on an incremental basis consistent with adopted local policies, regulations, and allowable uses. The past and present actions and RFDs listed in **Table 5-1** would be required to comply with applicable plans, policies, and development standards. During construction of RFDs, the potential would exist for construction-related traffic, noise and vibration, and air emissions to result in some temporary cumulative impacts on agricultural production and farm profitability within the spatial setting. These cumulative impacts would be temporary, occurring during the period of construction. While future development may result in a different type of land use in a particular location, that use would most likely be consistent with applicable plans, policies, and regulations and would therefore not be considered a cumulative impact to land and shoreline use. Improvement in rural roadways and lease payments from renewable energy projects to farmers would support long-term farm profitability and operations. **Conclusion:** With mitigation measures and the continued authority of Benton County zoning ordinances and land use requirements, the Proposed Action does not meaningfully contribute to a cumulative impact on agricultural productivity, profitability, or farm operations within the spatial and temporal setting.
Historic and Cultural Resources	Movement, alteration, and/or destruction of historic and cultural resources through ground disturbance, construction, and/or facility operation; loss of access to historic and cultural resources	**From the Project:** Impacts from the construction and operation of the wind turbines, solar arrays, substations, BESSs, and transmission lines would include ground disturbance, viewshed alteration, and restricted access to Traditional Cultural Properties. Changes to landforms, views, and accessibility would contribute to cumulative negative effects on historic and cultural resources by impacting the nature and use of the landscape. **From Past and Present Actions and RFDs:** Past and present actions and RFDs have cumulatively impacted the integrity of historic and cultural resources—specifically, their location, setting, feeling, and/or association. **Conclusion[(a)]: Due to changes in the nature and use of the landscape, the Proposed Action would meaningfully contribute to a cumulative impact on historic and cultural resources.**
Visual Aspects, Light and Glare	Domination of views, creation of shadow flicker, visible lighting, and glare	**From the Project:** Impacts from operation of the wind turbines, solar arrays, substations, BESSs, and transmission lines would generate long-term visual aspects, lighting, and sources of glare in the confined, local, and regional settings. Project aspects would dominate views, include visible light, and be a source of glare. There would be no cumulative impacts from construction or decommissioning as these visual aspects, glare, and light sources would be short term or temporary. **From Past and Present Actions and RFDs:** Past and present actions and RFDs have led to a cumulative impact on the spatial setting's visual aspects as they have introduced sources of lighting and glare. **Conclusion[(a)]: The Proposed Action meaningfully contributes to a cumulative impact on visual aspects within the spatial setting**.
Noise and Vibration	Noise and the potential for vibration	**From the Project:** Impacts from operations of the wind turbines, solar arrays, substations, BESSs, and transmission lines would generate long-term noise sources that could add to the present and RFDs in the local settings, but not regionally. Project aspects would generate noise that would be audible at the Lease Boundary and at neighboring receptors. There would be no cumulative impacts from construction or decommissioning as the noise and vibration sources would be temporary and limited to the area of construction and decommissioning. **From Past and Present Actions and RFDs:** Impacts from past and present actions and RFDs have the potential to cumulatively impact local noise environments. **Conclusion[(a)]: The Proposed Action meaningfully contributes to a cumulative impact on the local noise environment in the spatial setting.**
Recreation	Recreational activities could be altered, or recreationists could be unable to use the resource altogether; quality of recreational experience for recreationists may change considerably; continuance of recreational activities in the area of the Project could lead to public health and safety concerns.	**From the Project:** Impacts from the Proposed Action's construction and operations would result in the change in the quality of recreational experience of recreationists. **From Past and Present Actions and RFDs:** Impacts from past and present actions and RFDs have the potential to impact recreation—specifically, the use, quality of the experience, and health and safety of recreationists. **Conclusion[(a)]: The Proposed Action meaningfully contributes to a cumulative impact on recreational resources due to changes in the use, quality of the experience, and the health and safety of recreationists.**

Table 5-2: Cumulative Impacts with Proposed Action

Resource	Impacts from Proposed Action Alone	Cumulative Impacts from the Proposed Action and Past and Present Actions and RFDs
Public Health and Safety	Fire, smoke and haze, hazardous materials release	**From the Project:** Impacts from hazardous materials releases, fire, and resulting smoke and haze may result from construction of the wind turbines, solar arrays, substations, BESSs, and transmission lines, and operation and decommissioning of the Project. Impacts related to fire and hazardous materials release would be localized and temporary. Smoke and haze resulting from fire caused by the Project would be a regional impact because smoke can travel long distances. **From Past and Present Actions and RFDs:** The past and present actions and RFDs listed in **Table 5-1** have the potential to cause localized fires or hazardous materials spills. The Project would not contribute to cumulative impacts because these impacts would be localized and temporary. Controls would be in place to minimize Project impacts related to fire and hazardous materials spills. Smoke and haze could contribute to cumulative impacts if fires caused by existing projects or RFDs were to occur simultaneously, although this would be unlikely. Controls to minimize impacts related to fires would also reduce the likelihood of Project smoke and haze impacts. Although it is possible that fires caused by the Project and RFDs could occur at the same time, this scenario is very unlikely. **Conclusion:** The Proposed Action does not meaningfully contribute to a cumulative impact on public health and safety.
Public Services and Utilities	Level of service and safety	**From the Project**: Regulations and programs exist within Washington whose intent are to reduce the potential for interference with existing utilities during construction, operation, and decommissioning. **From Past and Present Actions and RFDs:** The past and present actions and RFDs listed in **Table 5-1** do not suggest a large increase in demand for utilities or public services; for instance, the number of transportation projects listed would not have a demand for the provision of utilities and would generally not have permanent need for service. **Conclusion:** The Proposed Action does not meaningfully contribute to a cumulative impact on level of service and safety within the spatial and temporal setting.
Transportation	Construction and decommissioning of the Project would lead to increased traffic volumes that would decrease the Level of Service of traffic routes; may lead to loss of access to public resources; and potentially cause a decrease in roadway safety.	**From the Project:** Impacts on transportation would occur during construction and decommissioning of the Project as a result of the decrease in level of service of traffic routes and loss of access to public resources and would potentially cause a decrease in roadway safety. **From Past and Present Actions and RFDs:** The past and present actions and RFDs listed in Table 5-1 have the potential to cause similar impacts to those listed for the Project. **Conclusion[(a)]:** Impacts on transportation would be short term during the construction and decommissioning of the Project. If other projects were constructed or decommissioned contemporaneously, contributions to cumulative impacts on transportation resources would be considerable. **Therefore, the Proposed Action has the potential to meaningfully contribute to impacts on transportation within the spatial and temporal setting.**
Socioeconomics	Housing Availability	**From the Project:** Project construction, operation, and decommissioning could impact populations onsite and adjacent to the site through Project-related impacts to housing availability. **From Past and Present Actions and RFDs:** The types of projects listed in **Table 5-1** do not indicate a need for an expanded workforce that would cause an increase in rental prices for housing within the spatial setting or change in demographics. For instance, transportation improvement projects, once complete, would no longer require a large number of staff to maintain the roadways. **Conclusion:** Vacant housing with abundant short-term rental options exists throughout the socioeconomic study area and spatial setting for this cumulative impact analysis. Mitigation measures would address and minimize the severity of impacts on the environmental setting. Therefore, the Proposed Action would not meaningfully contribute to a cumulative impact on housing availability.

BESS = battery energy storage system; EFSEC = Washington Energy Facility Site Evaluation Council; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter; PM_{10} = particulate matter less than or equal to 10 microns in diameter.

(a) = meaningful contribution to cumulative impacts

5.2.2 Identification of Meaningful Contributions to Cumulative Impacts and Determination of Significance from the Proposed Action

This section provides additional analysis for the resource topics listed in **Table 5-2** that would be subject to meaningful cumulative impacts from the Proposed Action within the defined spatial and temporal setting. This section also includes an analysis of the No Action Alternative. The No Action Alternative was included to demonstrate the extent of the cumulative impact from past and present actions and RFDs on the identified resources. While a determination of significance cannot be made for the whole of the past and present actions and RFDs for the identified resources, the presentation of the No Action Alternative indicates what the resource's status would be if the Proposed Action were not built.

Vegetation (Proposed Action)

As noted in **Table 5-2**, Project-related impacts on vegetation resources during Project construction and operation may contribute to cumulative impacts occurring regionally. While Project-related disturbance has been mostly sited within previously disturbed areas (e.g., agricultural land and developed/disturbed areas), Project construction would result in temporary and permanent disturbance to Priority Habitats, including sagebrush shrub-steppe and Eastside (interior) grasslands. Mitigation measures have been identified for these impacts that, when implemented, are expected to reduce the magnitude of effect. While it has been determined that the Proposed Action would meaningfully contribute to a cumulative impact on vegetation, the magnitude of that impact is dependent on the final design and implementation of the Proposed Action. The potential exists for a final design that lessens the residual impact and reduces the Proposed Action’s contribution to cumulative impacts on priority habitats and native plant species.

The Washington Department of Fish and Wildlife (WDFW) estimates that 80 percent of historic shrub-steppe habitat in Washington State has been lost or degraded from past development, including conversion to agriculture land (WDFW 2022a). Remaining patches of Priority Habitat are small and are becoming increasingly isolated. These factors make remaining patches of Priority Habitat vulnerable to further degradation from surrounding development (e.g., spread of invasive plants) and, potentially, to further loss from random events (e.g., large-scale wildfire).

The Project would be situated near known populations of special status plant species, mainly woven-spore lichen (*Texosporium sancti-jacobi*). Woven-spore lichen is associated with undisturbed shrub-steppe and grassland communities (DNR n.d.), which are present within the Lease Boundary. The proximity of present actions and RFDs presents the potential for further isolation of remaining populations. Loss of Priority Habitat and loss of native plant species, particularly native bunchgrasses, may impact the persistence of woven-spore lichen in the region considering past and present actions and RFDs.

Vegetation (No Action Alternative)

In the No Action Alternative, Priority Habitats and populations of special status plant species in the Project Lease boundary would not be altered or lost. Priority Habitats have historically been converted to agricultural lands, urban areas, and developments for resource extraction. In particular, the conversion to cropland has highly fragmented the remaining native shrub-steppe and grasslands. Similarly, the spatial extent of special status species that depend on these habitat types has been reduced. This trend is consistent for sagebrush shrub-steppe throughout eastern Washington, where sagebrush ecosystems are becoming increasingly fragmented by the expansion of communities and industries. Impacts from the past and present actions and RFDs listed in **Table 5-1** would result in similar adverse effects. These major threats to Priority Habitats are expected to persist in the No Action Alternative. Further, the impacts of these threats are expected to be exacerbated by the impacts of alterations associated with climate change (WDFW 2022a).

EFSEC Determination: The Proposed Action meaningfully contributes to cumulative impacts for loss and degradation of Priority Habitat and special status plant species.

Wildlife and Habitat (Proposed Action)

As noted in **Table 5-2**, Project-related impacts on wildlife and habitat during Project construction and operation may contribute to cumulative impacts occurring regionally. The Project is predicted to result in the permanent disturbance of natural (e.g., shrub-steppe) and modified habitat (agricultural land). Mitigation measures have been identified for these impacts that, when implemented, are expected to reduce the magnitude of effect. Natural habitats, particularly State Listed Priority Habitat (e.g., shrub-steppe) have been impacted by past developments, and permanent loss or alteration of these natural habitats associated with the Project would be additive to these past, present, and future losses resulting in cumulative habitat loss. While it has been determined that the Proposed Action would meaningfully contribute to a cumulative impact on wildlife and habitat, the magnitude of that impact is dependent on the final design and implementation of the Proposed Action. The potential exists for a final design that lessens the residual impact and reduces the Proposed Action's contribution to cumulative impacts on special status wildlife species and priority habitats.

WDFW estimates that 80 percent of historic shrub-steppe habitat in Washington State has been lost or degraded (WDFW 2022a). Similarly, indirect habitat loss through behavioral changes and displacement of wildlife associated with the construction and operation of the Project may be additive with similar disturbances associated with other regional projects and developments to further reduce the suitability and use of natural habitats. Creation of mitigation habitat (e.g., offset) associated with the Project is expected to reduce the Project's contribution to cumulative impacts on habitat. Cumulative loss and modification of natural habitat is expected to be more notable for special status species (see Section 3.6 for definition), as these populations are generally affected in the existing conditions, prior to consideration of the Project, due to historical changes to the landscape. Specific to the Project, cumulative effects on special status species associated with sage brush habitat, such as sagebrush lizard (*Scleoporus graciuosus*), sage thrasher (*Oreoscoptes montanus*), sagebrush sparrow (*Artemisiospiza nevadensis*), and Townsend's ground squirrel (*Urocitellus townsendii towsendii*), are expected to be more notable as past and present actions have reduced the regional habitat capacity for this group of species.

The Project would be situated near mapped wildlife movement corridors, and, if the final siting of Project components were to result in loss of habitat within those corridors, the Project could contribute to the cumulative barriers to wildlife movement over the landscape created by past and present actions and RFDs in the region. The final Project siting has not been completed, and if major Project components, such as solar arrays, are not located on mapped movement corridors, the Project's contribution to cumulative barriers to movement would be reduced. Wider-ranging special status species, such as pronghorn antelope (*Antilocapra americana*), are expected to be more influenced by cumulative barriers to movement as these barriers can reduce animals' ability to move between habitats on the landscape. The culmination of development, roadways, and projects creates a fragmented network of habitat types and introduces obstacles that can deter wildlife movement (e.g., roads) or require wildlife to expend additional energy to move around (e.g., fences).

The Project is expected to result in wildlife mortality during construction and operation, predominantly associated with birds and bats during the operation of wind turbines. Mortality of aerial species associated with the Project is expected to occur cumulatively with mortality associated with other regionally occurring projects, particularly other wind power projects such as the Nine Canyon and Stateline Wind Projects. These cumulative impacts are expected to be greater for species identified in Section 4.6 as having a greater risk of interacting with wind turbines, such as horned lark (*Eremophila alpestris*), as well as special status species that are at risk of collision with turbines (e.g., American white pelican [*Pelecanus erythrorhynchos*] and sandhill crane [*Antigone canadensis*]).

Finally, the Project is anticipated to have the potential for high-magnitude effects on ferruginous hawk (*Buteo regalis*) due to its proximity to active nests (i.e., nests recorded during Project surveys that were occupied by a ferruginous hawk or its egg), impacts on foraging habitat, and potential to result in mortality. Mitigation measures have been identified for these impacts that, when implemented, are expected to reduce the high-magnitude effect. This species is state-listed as endangered, partially due to the cumulative loss of range within Washington State, as well as mortality from electrocution and collisions with turbines (WDFW 2022b).

Habitat loss and mortality associated with the Project are expected to be additive to past and present actions and RFDs in the region, resulting in cumulative impacts on the species. Cumulative habitat loss can be attributed to the nibbling effects of conversion of lands from native shrub-steppe due to projects and other developments. Similarly, ferruginous hawk mortalities may occur at a variety of project sites; however, the greatest risk of mortality for this species is expected to occur at projects that create obstacles within the raptor’s flight path, such as powerlines and wind power projects. Therefore, the impacts of mortality from the Project are expected to be additive to similar projects (transmission lines and wind power projects) in the region while being less likely to be additive with ground-level projects, such as road construction.

Wildlife and Habitat (No Action Alternative)

In the No Action Alternative, wildlife populations, habitats, and movement corridors in the Project Lease Boundary would continue to function and persist following similar trends as current conditions. Wildlife habitat and movement corridors have regionally been impacted by alteration and development on natural habitats. Impacts from the past and present actions and RFDs listed in **Table 5-1** would result in similar adverse effects to wildlife habitats and movement corridors as have occurred regionally. Pressures on habitats and movement corridors are expected to persist in the region in the No Action Alternative. The short- and long-term population trends (increasing, stable, decreasing) of Priority wildlife species with potential to occur in the Lease Boundary are described in Table 3.6-3. These trends are expected to persist in the No Action Alternative, with species populations currently reported to be declining and continuing to decline.

EFSEC Determination: The Proposed Action meaningfully contributes to cumulative impacts for habitat loss and degradation, barriers to movement, wildlife mortality, and special status species.

Historic and Cultural Resources (Proposed Action)

As noted in **Table 5-2**, Project-related impacts on historic and cultural resources may contribute to cumulative impacts within the spatial and temporal setting of the Proposed Action. Changes to the nature and use of the landscape are likely to result from the construction and operation of the Project and from past and present actions and RFDs. Mitigation measures have been identified for these impacts that, when implemented, are expected to reduce the magnitude of effect. Cumulative impacts from ground disturbance, viewshed alteration, and restricted access to Traditional Cultural Properties are likely to alter the nature and use of the landscape. Cumulative impacts from past and present actions and RFDs may affect the location, setting, feeling, and/or association of historic and cultural resources, resulting in a potential loss of the integrity of these resources.

Historic and Cultural Resources (No Action Alternative)

Under the No Action Alternative, historic and cultural resources within the Project Lease Boundary would continue to persist following similar trends as current conditions. Ground disturbance and construction activities may result in movement, alteration, and/or destruction of historic and cultural resources. Impacts from the past and present actions and RFDs listed in **Table 5-1** would result in similar adverse effects. Continued deterioration of historic-period cultural materials, such as metal and glass artifacts, can be expected. Displacement of precontact and historic-period cultural materials and subsurface deposits is likely through natural processes such as erosion and disturbance of sedimentary deposits by living organism. The trend of deterioration and displacement through natural processes is expected to persist in the No Action Alternative; however, deterioration and displacement take place over long timespans and do not result in the complete destruction of cultural materials.

EFSEC Determination: Project meaningfully contributes to cumulative impacts for historic and cultural resources, including changes to the nature and use of landscape.

Visual Aspects

As noted in **Table 5-2**, Project-related impacts on visual aspects may contribute to cumulative impacts within the spatial and temporal setting of the Proposed Action. Modifications of the existing landscape character, as well as the introduction of lighting and sources of glare, would occur from the operation of the Project and from past and present actions and RFDs. Mitigation measures have been identified for these impacts that, when implemented, are expected to reduce the magnitude of effect. These effects include dominating the area's landscape character through the introduction of large-scale energy infrastructure, as well as dominating views from viewing locations where the setting would appear heavily modified. In combination with past and present actions and RFDs, the visual impacts from the Proposed Action are expected to be additive to similar projects (transmission lines and wind power projects) in the region while being less likely to be additive with ground-level projects, such as road construction.

Visual Aspects (No Action Alternative)

Under the No Action Alternative, past and present actions and RFDs would continue to modify the area's landscape character but due to the scale of these projects, the regional landscape character would not be dominated by large-scale energy infrastructure. Views may be locally dominated by these projects, but their influence on views would diminish with distance resulting in minimal impacts on the regional setting. Regarding light, if the No Action Alternative occurs, there would continue to be modifications to minor sources of visible light from the projects listed in **Table 5-1**. Past and present actions and RFDs have not contributed glare to the spatial setting.

EFSEC Determination: The Proposed Action meaningfully contributes to cumulative impacts for visual aspects, including alteration of landscape character and introduction of sources of lighting and glare.

Noise (Proposed Action)

As noted in **Table 5-2**, Project-related operational impacts on noise may contribute to cumulative impacts within the spatial and temporal setting of the Proposed Action. Project aspects would generate noise that would be audible at the Lease Boundary and neighboring receptors. Mitigation measures have been identified for these impacts that, when implemented, are expected to reduce the magnitude of effect. Impacts from long-term noise sources could add to the present developments and RFDs in the local settings, but not regionally. In combination with past and present actions and RFDs, the noise impacts from the Proposed Action are expected to be additive to similar projects (wind power and solar projects) and other sources of noise, including agricultural and transportation on the local level, but less likely to affect regional noise levels.

Noise (No Action Alternative)

Under the No Action Alternative, past and present actions and RFDs listed in **Table 5-1** would continue to include temporary and long-term noise sources that would impact the local noise environment, but not in the regional setting. The projects listed in **Table 5-1** would cause short-term impacts during construction, but the effects would be localized and temporary. Long-term sources of vibration that could contribute to cumulative impacts were not identified amongst the projects listed in **Table 5-1**.

EFSEC Determination: The Proposed Action meaningfully contributes to cumulative impacts for audible noise generation for Project receptors.

Recreation (Proposed Action)

As noted in **Table 5-2**, Project-related impacts on recreation resources would contribute to cumulative impacts occurring regionally. Impacts on recreational use, quality of experience, and health and safety of recreationists would occur during Project construction and operation. Mitigation measures have been identified for these impacts that, when implemented, are expected to reduce the magnitude of effect.

The Project would be situated near paragliding launching and landing sites with flight paths directly over proposed turbine and solar field locations. The Project area is frequently used for biking and hiking, with recreationists using public land within the Project area or near the extent of the Project boundary. The Applicant proposes to construct solar arrays on a parcel of land administered by the Washington Department of Natural Resources, limiting recreational activities to outside the solar field’s fence.

Cumulative impacts from past and present actions and RFDs may also affect recreational use, quality of experience, and health and safety of recreationists. Cumulative loss of the use for recreation resources occurs when lands, frequently used for recreation activities, are taken out of use during the construction and operation of non-recreation projects or recreation activities are indirectly impacted by projects (e.g., visual, noise, etc.).

Recreation (No Action Alternative)

Under the No Action Alternative, the past and present actions and RFDs listed in Table 5-1 would continue to modify the area’s recreation opportunities. Recreationists would experience the change in use, recreational experience, or the potential of decreased public health and safety during the activity. Depending on the identified RFD, crowding or loss of use altogether may occur or values that a recreationist deems as important to their individual experience may become altered.

EFSEC Determination: The Proposed Action meaningfully contributes to cumulative impacts for use and quality of recreation resources and safety and access of recreationists.

Transportation (Proposed Action)

As noted in **Table 5-2**, Project-related impacts on transportation resources may contribute to cumulative impacts occurring regionally. Short-term impacts on the level of service of traffic routes, access to public resources, and roadway safety are expected during Project construction and decommissioning. Mitigation measures have been identified for these impacts that, when implemented, are expected to reduce the magnitude of effect.

Cumulative impacts from past and present actions and RFDs have the potential to affect the level of service of traffic routes, cause loss of access to public resources, and decrease roadway safety if constructed or decommissioned contemporaneously.

Transportation (No Action Alternative)

Under the No Action Alternative, past and present actions and RFDs listed in **Table 5-1** would continue to modify the area's traffic patterns, level of service, and transportation requirements, especially during construction and decommissioning of the identified Projects. Due to the scale of these RFDs, traffic patterns are likely to change during construction and decommissioning, level of service would decrease but only for the short term, and roads and intersections may continue to be altered to provide access to heavy and oversize loads.

EFSEC Determination: The Proposed Action meaningfully contributes to cumulative impacts for traffic volumes, level of service, and roadway safety.

5.2.2.1 Summary of Combined Determination of Significance

Table 5-3 presents the resources that the Proposed Action would cumulatively impact in a meaningful way, along with the significance determination of those impacts. It describes the direct or indirect impact that the Proposed Action would have for each resource, and whether that impact would be significant with the identified recommended mitigation measures implemented. Finally, it indicates whether that impact would make a meaningful contribution to a cumulative impact when combined with past and present actions and RFDs.

Table 5-3: Cumulative Impact Analysis Summary

Section	Topic	Description of Impact from the Proposed Action	Significant Direct or Indirect Impact from the Proposed Action	Cumulative Impacts from Past and Present Actions and RFDs	Proposed Action Meaningfully Contributes to a Cumulative Impact
Vegetation	Priority Habitat	Loss and degradation of Priority Habitat	No	Yes	Yes
Vegetation	Special Status Plant Species	Loss and isolation of special status plant species	No	Yes	Yes
Wildlife and Habitat	Habitat Loss	Habitat loss and degradation	No	Yes	Yes
Wildlife and Habitat	Barriers to Movement and Fragmentation	Fencing as a barrier to movement and fragmentation of habitat due to Project footprint	No	Yes	Yes
Wildlife and Habitat	Wildlife Mortality	Mortalities from wildlife-vehicle collisions or turbine strikes	No	Yes	Yes
Wildlife and Habitat	Special Status Species	Loss of special status species from mortalities or loss or degradation of habitat	No	Yes	Yes
Historic and Cultural Resources	Archaeological Resources	Partial or complete loss of archaeological resources	Yes	Yes	Yes
Historic and Cultural Resources	Traditional Cultural Properties	Partial or complete loss of traditional cultural properties and resources	Yes	Yes	Yes
Visual Aspects, Light and Glare	Visual Aspects	Turbines would dominate the existing landscape and viewshed.	Yes	Yes	Yes
Visual Aspects, Light and Glare	Light and Glare	Security lighting and solar panels would introduce sources of light and glare	No	Yes	Yes
Noise and Vibration	Noise	Noise from construction and Project components during operation.	No	Yes	Yes
Recreation	Recreation - Use	Reduction in access to available recreation lands	No	Yes	Yes
Recreation	Recreation – Public Health and Safety	Health and safety of paragliders and hang gliders	Yes	Yes	Yes
Transportation	Traffic Volume	Increased traffic volume from construction and decommissioning	No	Yes	Yes
Transportation	Level of Service	Decreased level of service for motorists, particularly at intersections close to Project	No	Yes	Yes
Transportation	Roadway Safety	Safety of motorists due to the presence and movement of heavy vehicles	No	Yes	Yes

This Page Intentionally Left Blank

6.0 CHAPTER 6 – REFERENCES

Note: Electronic sources were consulted on the access dates provided; web addresses and web-based information are subject to change.

6.1 Executive Summary

CEQ (Council on Environmental Quality). 2005. Guidance on the Consideration of Past Actions in Cumulative Effects Analysis. Accessed October 1, 2021. https://www.energy.gov/sites/default/files/nepapub/nepa_documents/RedDont/G-CEQ-PastActsCumulEffects.pdf.

GAL (Golder Associates Ltd.). 2022. Wind Turbine Wildlife Collision Risk Assessment Horse Heaven Wind Farm. Submitted to Horse Heaven Wind Farm, LLC. April 2022.

Horse Heaven Wind Farm, LLC. 2021. Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification. EFSEC Docket Number: EF-210011. February.

SWCA (SWCA Environmental Consultants). 2022. Horse Heaven Wind Farm Project Final Visual Impact Assessment Report. Prepared for Washington Energy Facility Site Evaluation Council (EFSEC). April 2022.

6.2 Chapter 1 – Project Background and Purpose and Need

No references are within Chapter 1.

6.3 Chapter 2 – Proposed Action and Alternatives

Benton County. 2021. Benton County Comprehensive Plan. Updated June 2021, Adopted on February 13, 2018. Amendments adopted by resolution January 14, 2020. Accessed November 3, 2021. https://www.co.benton.wa.us/pview.aspx?id=1425&catid=0.

Horse Heaven Wind Farm, LLC. 2021. Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification EFSEC Docket Number: EF-210011. February.

Larsen, E., J. M. Azerrad, and N. Nordstrom, editors. 2004. Cited in Horse Heaven Wind Farm, LLC. 2021. Management recommendations for Washington's priority species, Volume IV: Birds. Washington Department of Fish and Wildlife, Olympia, Washington, USA.

USFWS (U.S. Fish and Wildlife Service). 2012. Cited in Horse Heaven Wind Farm, LLC. 2021. Land-Based Wind Energy Guidelines. March 23, 2012. http://www.fws.gov/cno/pdf/Energy/2012_Wind_Energy_Guidelines_final.pdf.

USFWS (U.S. Fish and Wildlife Service). 2013. Cited in Horse Heaven Wind Farm, LLC. 2021. Eagle Conservation Plan Guidance: Module 1 - Land-Based Wind Energy, Version 2. U.S. Department of the Interior, Fish and Wildlife Service, Division of Migratory Bird Management. April 2013. https://www.fws.gov/migratorybirds/pdf/management/eagleconservationplanguidance.pdf.

USFWS (U.S. Fish and Wildlife Service). 2016. Cited in Horse Heaven Wind Farm, LLC. 2021. Eagle Permits; Revisions to Regulations for Eagle Incidental Take and Take of Eagle Nests. Final Rule. Federal Register 81(242): 91494-91554. December 16, 2016.

WDFW (Washington Department of Fish and Wildlife). 2009. Cited in Horse Heaven Wind Farm, LLC. 2021. Washington Department of Fish and Wildlife Wind Power Guidelines. Draft: WDFW January 30, 2009, Wind Power Guidelines On-Line, Olympia, Washington. March 2009.

6.4 Chapter 3 – Affected Environment

Section 3.2 – Earth Resources

Atwater, B. F., A. R. Nelson, J. J. Clague, G. A. Carver, T. Bobrowsky, J. Bourgeois, M. E. Darienzo, W. C. Grant, E. Hemphill-Haley, H. M. Kelsey, G. C. Jacoby, S. P. Nishenko, S. P., Palmer, C. D. Peterson, M. A. Reinhart, and D.K. Yamaguchi. 1995. Summary of Coastal Geologic Evidence for Past Great Earthquakes at the Cascadia Subduction Zone. Earthquake Spectra 11:1–18.

Atwater, B. F., M. R. Satoko, S. Kenji, T. Yoshinobu, U. Kazue, and D. K. Yamaguchi. 2005. The Orphan Tsunami of 1700: Japanese Clues to a Parent Earthquake in North America. USGS Professional Paper 1707.

Benton County. 2019. Natural Hazard Mitigation Plan 2019 Revision. Accessed December 13, 2021. https://www.ci.benton-city.wa.us/files/documents/document1641113110081619.pdf.

Benton County. 2021. Online Zoning Map - Liquefaction. Accessed November 24, 2021. https://www.co.benton.wa.us/pview.aspx?id=1701&catid=0.

Brocher, T. M., R. E. Wells, A. P. Lamb, and C. S. Weaver. 2017. Evidence for Distributed Clockwise Rotation of the Crust in the Northwestern United States from Fault Geometries and Focal Mechanisms. Tectonics 36(5):787–818.

Clague, J. J., P. T. Bobrowsky, and I. Hutchinson. 2000. A Review of Geological Records for Large Tsunamis at Vancouver Island, British Columbia and Implications for Hazard. Quaternary Science Reviews 19: 849–863.

Clarke, S. E. and S. A. Bryce. 1997. Hierarchical Subdivisions of the Columbia Plateau and Blue Mountains Ecoregions, Oregon, and Washington (Vol. 395). United States Department of Agriculture, Forest Service, Pacific Northwest Research Station.

DNR (Department of Natural Resources). 2015. Significant Deep-Seated Landslides in Washington State – 1984 to 2014. https://www.dnr.wa.gov/publications/ger_list_large_landslides.pdf.

Ecology (Washington State Department of Ecology). 2020. Groundwater Resources. Accessed October 11, 2020. https://ecology.wa.gov/Water-Shorelines/Water-quality/Groundwater/Groundwater-resources.

Fannie Mae. 2017. United States Geological Survey (USGS) Peak Ground Acceleration (PGA) Calculator Tutorial (Beta – Unified Hazard Tool). https://multifamily.fanniemae.com/media/7371/display. Accessed December 17, 2021.

Horse Heaven Wind Farm, LLC. 2021. Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification. EFSEC Docket Number: EF-210011. February 2021.

Huntting, M. T., W. A. G. Bennett, V. E. Livingston, Jr., and W. S. Moen, W. S. 1961. Geologic Map of Washington: Washington Division of Mines and Geology, scale 1:500,000.

Kelsey, H. M., A. R. Nelson, E. Hemphill-Haley, and R. Witter. 2005. Tsunami History of an Oregon Coastal Lake Reveals a 4600 Year Record of Great Earthquakes on the Cascadia Subduction Zone. Geological Society of America Bulletin 117:1009–1032.

McGarr, A., and R. C. Vorhis. 1968. Seismic Seiches from the March 1964 Alaska Earthquake, U.S. Geol. Survey Prof. Paper, p. E1 –E.

Moen, W. S. and G. B. McLucas. 1981. Mount St. Helens Ash – Properties and Possible Uses. Washington Department of Natural Resources, Division of Geology and Earth Resources. Report of Investigations 24. Olympia, Washington.

Nelson, A. R., H. M. Kelsey, and R. C. Witter. 2006. Great Earthquakes of Variable Magnitude at the Cascadia Subduction Zone. Quaternary Research 65:354–365.

Pacific Northwest Seismic Network. 2021. Cascadia Subduction Zone. Accessed November 23, 2021. https://pnsn.org/outreach/earthquakesources/csz.

Reidel, S. P, B.S. Martin, and H. L. Petcovic. 2003. Western Cordillera and Adjacent Areas – Chapter 4: The Columbia River Flood Basalts and the Yakima Fold Belt.

Swanson, D. A., K. A. Cameron, R. C. Evarts, P. T. Pringle, and J. A. Vance. 1989. IGC Field Trip T106: Cenozoic Volcanism in the Cascade Range and Columbia Plateau, Southern Washington and Northernmost Oregon. Field Trip Guidebooks, 106, 1-60. American Geophysical Union.

Sweeney, M. R., E. V. McDonald, and D. R. Gaylord. 2017. Generation of the Palouse Loess: Exploring the Linkages between Glaciation, Outburst Megafloods, and Eolian Deposition in Washington State. From the Puget Lowland to East of the Cascade Range: Geologic Excursions in the Pacific Northwest 49.

USDA (U.S. Department of Agriculture). 2021. Web Soil Survey. Accessed November 23, 2021. https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm

USGS (U.S. Geological Survey). Not dated (a). Quaternary Faults and Folds Database. Accessed November 23, 2021: https://www.usgs.gov/natural-hazards/earthquake-hazards/faults.

USGS (U.S. Geological Survey). Not dated (b). U.S. Geological Survey. Unified Hazard Tool. Accessed November 23, 2021. https://earthquake.usgs.gov/hazards/interactive/.

USGS (U.S. Geological Survey). Not dated (c). Mission Areas; Natural Hazards. Accessed November 24, 2021. https://www.usgs.gov/mission-areas/natural-hazards.

USGS (U.S. Geological Survey). Not dated (d). Geologic units containing Landslide. Accessed December 17, 2021. https://mrdata.usgs.gov/geology/state/sgmc-lith.php?code=1.5.4.

USGS (U.S. Geological Survey). Not dated (e). Cascades Volcano Observatory. Accessed November 23, 2021. https://www.usgs.gov/observatories/cascades-volcano-observatory

WAC (Washington Administrative Code). Chapter 365-190, Section 365-190-120, Geologically hazardous areas. Accessed December 02, 2022. https://app.leg.wa.gov/wac/default.aspx?cite=365-190-120#:~:text=(1)%20Geologically%20hazardous%20areas.,in%20areas%20of%20significant%20hazard.

WAC (Washington Administrative Code). Chapter 463-62, Section 463-62-020, Seismicity. Accessed December 02, 2022. https://app.leg.wa.gov/wac/default.aspx?cite=463-62-020.

Washington Division of Geology and Earth Resources. 2016. Simplified Volcanic Hazards, Adapted from U.S. Geological Survey—GIS Data: Washington Division of Geology and Earth Resources, version 1.0, May 2016. Accessed October 5, 2021. https://www.dnr.wa.gov/programs-and-services/geology/publications-and-data/gis-dataand-databases.

Weary, D.J., and D. H. Doctor. 2014. Karst in the United States: A Digital Map Compilation and Database: U.S. Geological Survey Open-File Report 2014–1156, 23. Accessed November 23, 2021. https://dx.doi.org/10.3133/ofr20141156.

Wells, R. E., and P. L. Heller. 1988. The Relative Contribution of Accretion, Shear, and Extension to Cenozoic Tectonic Rotation in the Pacific Northwest. Geological Society of America Bulletin 100:325–338.

Wells, R. E., and R. W. Simpson. 2001. Northward Migration of the Cascadia Forearc in the Northwestern U.S. and Implications for Subduction Deformation. Earth Planet Special Publication 53:275–283.

Wolfe, E. W., and T. C. Pierson. 1995. Volcanic-hazard Zonation for Mount St. Helens, Washington. USGS Open-File Report 95-497.

Yeats, R. 2004. Living with Earthquakes in the Pacific Northwest – Chapter 5: Earthquakes in the Juan de Fuca Plate. Oregon State University.

Youd, T. L., and I. M. Idriss. 2001. Liquefaction Resistance of Soils: Summary Report from the 1996 NCEER and 1998 NCEER/NSF Workshops on Evaluation of Liquefaction Resistance of Soils. Journal of Geotechnical and Geoenvironmental Engineering. 127(4).

Section 3.3 – Air Quality

Ecology (Washington State Department of Ecology). 2020. 2017 Washington Comprehensive Emissions Inventory. Accessed December 15, 2021. https://apps.ecology.wa.gov/publications/SummaryPages/2002012.html.

Ecology (Washington State Department of Ecology). Not dated. Tracking Greenhouse Gases. Accessed March 9, 2022. https://ecology.wa.gov/Air-Climate/Climate-change/Tracking-greenhouse-gases.

Ecology (Washington State Department of Ecology). Not dated (b). Chapter 173-446 WAC. Accessed November 23, 2022. https://ecology.wa.gov/Regulations-Permits/Laws-rules-rulemaking/Rulemaking/WAC-173-446.EPA (U.S. Environmental Protection Agency). 2020a. Nonattainment Areas for Criteria Pollutants (Green Book). Updated September 30, 2020. Accessed January 17, 2022. https://www.epa.gov/green-book

EPA (U.S. Environmental Protection Agency). 2020b. Interactive Map of Air Quality Monitors. Updated January 30, 2019. Accessed January 18, 2022. https://www.epa.gov/outdoor-air-quality-data/interactive-map-air-quality-monitors.

Hanna, Steven R., A. Briggs, A. Gary, and R. P. Hosaker. 1982. Handbook on Atmospheric Diffusion. DOE/TIC-11223. Technical Information Center, U.S. Department of Energy.

Horse Heaven Wind Farm, LLC. 2021a. Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification. EFSEC Docket Number: EF-210011. February 2021.

Horse Heaven Wind Farm, LLC. 2021b. Response to Data Request No.2; AIR-1 through AIR-13 submitted to the Washington Energy Facility Site Evaluation Council in support of Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification. EFSEC Docket Number: EF-210011.

RCW (Revised Code of Washington). Chapter 70A.15, Washington Clean Air Act. Accessed December 2, 2022. https://apps.leg.wa.gov/rcw/default.aspx?cite=70A.15.

WAC (Washington Administrative Code). Chapter 173-476, Ambient Air Quality Standards. Accessed December 2, 2022. https://apps.leg.wa.gov/wac/default.aspx?cite=173-476.

WAC (Washington Administrative Code). Chapter 463-62, Section 463-62-070, Air quality. Accessed December 2, 2022. https://app.leg.wa.gov/WAc/default.aspx?cite=463-62-070.

WAC (Washington Administrative Code). Chapter 463-78, General and Operating Permit Regulations for Air Pollution Sources. Accessed December 2, 2022. https://app.leg.wa.gov/wAC/default.aspx?cite=463-78&full=true.

WAC (Washington Administrative Code). Chapter 173-400, General Regulations for Air Pollution Sources. Accessed December 2, 2022. https://apps.leg.wa.gov/wac/default.aspx?cite=173-400.

WAC (Washington Administrative Code). Chapter 463-78, Section 463-78-095, Permit issuance. Accessed December 2, 2022. https://app.leg.wa.gov/wac/default.aspx?cite=463-78-095.

WAC (Washington Administrative Code). Chapter 173-400, Section 173-400-040, General standards for maximum emissions. Accessed December 2, 2022. https://apps.leg.wa.gov/wac/default.aspx?cite=173-400-040.

WAC (Washington Administrative Code). Chapter 173-441, Reporting of Emissions of Greenhouse Gases. Accessed December 2, 2022. https://apps.leg.wa.gov/wac/default.aspx?cite=173-441.

Section 3.4 – Water Resources

Benton County. Not dated. Benton County Critical Area Regulations. Accessed January 19, 2022. https://www.co.benton.wa.us/files/documents/CriticalAreasOrdinance129062044100317PM.pdf.

Benton County. 2018. Critical Aquifer Recharge Areas. Accessed December 16, 2021. https://www.co.benton.wa.us/pview.aspx?id=20971&catid=0

Ecology (Washington State Department of Ecology). 2019. National Hydrography Dataset for Washington. Published May 2019. Accessed January 21, 2022. https://ecology.wa.gov/Research-Data/Data-resources/Geographic-Information-Systems-GIS/Data#h.

Ecology (Washington State Department of Ecology). 2020. Water Quality Atlas. Accessed December 9, 2021. https://apps.ecology.wa.gov/waterqualityatlas/wqa/startpage.

Ecology (Washington State Department of Ecology). 2021. State Wide WRIA Finder. Accessed December 20, 2021. https://waecy.maps.arcgis.com/apps/webappviewer/index.html?id=996e6b21ae394cc3a3b63c6da0c3aa0a.

Ecology (Washington State Department of Ecology). 2022a. Freshwater Information Network. Accessed January 20, 2022. https://apps.ecology.wa.gov/eim/search/SMP/RiverStreamSearch.aspx?StudyMonitoringProgramUserId=RiverStream&StudyMonitoringProgramUserIdSearchType=Equals&MPLocationStatus=Active.

Ecology (Washington State Department of Ecology). 2022b. River & stream water quality index. Accessed April 1, 2022. https://ecology.wa.gov/Research-Data/Monitoring-assessment/River-stream-monitoring/Water-quality-monitoring/River-stream-water-quality-index.

EPA (U.S. Environmental Protection Agency). 2008. The Ecological and Hydrological Significance of Ephemeral and Intermittent Streams in the Arid and Semi-arid American Southwest. November 2008. Accessed January 21, 2022. https://www.epa.gov/sites/default/files/2015-03/documents/ephemeral_streams_report_final_508-kepner.pdf.

Horse Heaven Wind Farm, LLC. 2021. Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification. EFSEC Docket Number: EF-210011. February 2021.

Hruby, T. 2014. Washington State Wetland Rating System for Eastern Washington 2014 Update. SEA Program, Washington State Department of Ecology. Olympia, Washington.

Lichvar, R. W., N. C. Melvin, M. L. Butterwick, and W. N. Kirchner. 2012. National Wetland Plant List Indicator Rating Definitions. Engineer Research and Development Centre, U.S. Army Corps of Engineers. July 2012. 7 pp. Accessed January 21, 2022. https://cwbi-app.sec.usace.army.mil/nwpl_static/data/DOC/NWPL/pubs/2012b_Lichvar_et_al.pdf.

Lichvar, R.W., D.L Banks, W.N. Kirchner, N.C. Melvin. 2016. The National Wetland Plant List: 2016 wetland ratings. Phytoneuron 2016-30:1-17.

Nadeau, T. 2015. Streamflow Duration Assessment Method for the Pacific Northwest. EPA 910-K-14-001, U.S. Environmental Protection Agency, Region 10, Seattle, Washington.

Tetra Tech. 2021. Amendment to the Wetlands and Other Waters Delineation Report for the Horse Heaven Wind Farm Project. December 2020 and amendment August 2021. 9 pp + Appendices.

USACE (U.S. Army Corps of Engineers). 2020. 2020 National Wetland Plant List v3.5 – Mapper Tool. Accessed November 25, 2021. https://cwbi-app.sec.usace.army.mil/nwpl_static/v34/mapper/mapper.html#.

USGS (United States Geological Survey). 2022. USGS Current Water Data for Washington. Accessed January 20, 2022. https://waterdata.usgs.gov/wa/nwis/rt.

U.S. Climate Data. 2021. Climate Kennewick – Washington. Accessed November 18, 2021. https://www.usclimatedata.com/climate/kennewick/washington/united-states/uswa0205.

USFWS (U.S. Fish and Wildlife Service). 2021. National Wetlands Inventory – Wetlands Mapper. Accessed January 19, 2022. https://www.fws.gov/wetlands/data/Mapper.html.

Washington State. 2022. Washington Administrative Code. Accessed January 19, 2022. https://apps.leg.wa.gov/wac/.

Section 3.5 – Vegetation

BCNWCB (Benton County Noxious Weed Control Board). Not dated. Class "A" Noxious Weeds. Accessed December 21, 2021. http://www.bentonweedboard.com/bc-class-a-weeds

Clarke, S. E., and S. A. Bryce. 1997. Hierarchical Subdivisions of the Columbia Plateau and Blue Mountains Ecoregions, Oregon and Washington. General Technical Report. PNW-GTR-395. Portland, Oregon. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station.

DNR (Washington State Department of Natural Resources). 2021. Species Lists. Accessed December 17, 2021. https://www.dnr.wa.gov/NHPlists.

Franklin, J. F., and C. T. Dyrness. 1988. Natural Vegetation of Oregon and Washington. Oregon State University Press. Accessed December 17, 2021. http://www.fsl.orst.edu/rna/Documents/publications/Natural%20vegetation%20of%20Oregon%20and%20Washington%201988.pdf.

Horse Heaven Wind Farm, LLC. 2021a. Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification. EFSEC. Docket Number: EF-210011. February 2021.

Horse Heaven Wind Farm, LLC. 2021b. Response from Tetra Tech to Data Request No.4; DEIS-1. Submitted to the Washington Energy Facility Site Evaluation Council in support of Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification. EFSEC Docket Number: EF-210011.

Horse Heaven Wind Farm, LLC. 2021c. Response to Data Request No.1 and No.2; Veg-6, Hab-11 to Hab-14. Submitted to the Washington Energy Facility Site Evaluation Council in support of Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification. EFSEC Docket Number: EF-210011.

Johnson, D. H., and T. A. O'Neil. 2001. Wildlife-Habitat Relationships in Oregon and Washington. Corvallis, Oregon: Oregon State University Press.

Knick, S. T., D. S. Dobkin, J. T. Rotenberry, M.A. Schroeder, W. M. Vander Haegen, and C. van Riper III. 2003. Teetering on the Edge or Too Late? Conservation and Research Issues for Avifauna of Sagebrush Habitats. The Condor 105 (4):611 – 634.

MRLC (Multi-Resolution Land Characteristics Consortium). Not dated. National Land Cover Database 2019 (NLCD 2019) Legend. Accessed December 17, 2021. https://www.mrlc.gov/data/legends/national-land-cover-database-2019-nlcd2019-legend.

Tetra Tech. 2021. 2021 Botany and Habitat Survey Report for Horse Heaven Wind Farm. Prepared for Horse Heaven Sind Farm, LLC by Tetra Tech. August 2021.

Unland, Chad. 2022. Personal communication (email) from Chad Unland, Natural Resources Specialist, Southeast Region, Washington State Department of Natural Resources to Amy Moon, Energy Facility Site Specialist, Washington Energy Facility Site Evaluation Council, January 26, 2022.

U.S. Climate Data. 2021. Climate Kennewick – Washington. Accessed 18 November 2021. https://www.usclimatedata.com/climate/kennewick/washington/united-states/uswa0205.

USFWS (United States Fish and Wildlife Service). 2014. Why Care about America's Sagebrush? February 2014. Denver, Colorado.

WDFW (Washington Department of Fish and Wildlife). 2008. Priority Habitat and Species List. 2021 Update. Olympia, Washington.

WDFW (Washington Department of Fish and Wildlife). 2009. Wind Power Guidelines. Olympia, Washington. https://wdfw.wa.gov/sites/default/files/publications/00294/wdfw00294.pdf.

WDFW (Washington Department of Fish and Wildlife). 2022. PHS on the Web. Downloaded: January 25, 2022. https://geodataservices.wdfw.wa.gov/hp/phs/

WDFW (Washington Department of Fish and Wildlife). Not dated. PHS on the Web. Accessed November 24, 2021. https://geodataservices.wdfw.wa.gov/hp/phs/.

WNHP (Washington Natural Heritage Program). 2011. Washington Natural Heritage Program List of Lichens. 4 pp. https://www.dnr.wa.gov/publications/amp_nh_lichens.pdf.

WNHP (Washington Natural Heritage Program). 2021a. 2021 Washington Vascular Plant Species of Conservation Concern. Natural Heritage Report 2021-04. 31 August 2021. https://www.dnr.wa.gov/publications/amp_nh_vascular_ets.pdf.

WNHP (Washington Natural Heritage Program). 2021b. Online Field Guide to the Rare Plants of Washington. Accessed January 18, 2022. https://fieldguide.mt.gov/wa.

WNHP (Washington Natural Heritage Program). 2022. Washington Natural Heritage Program, Washington Department of Natural Resources, Olympia, WA. U.S.A. Accessed January 6, 2022. https://www.dnr.wa.gov/NHPdata.

WSNWCB (Washington State Noxious Weed Control Board). Not dated. Noxious Weed List. Accessed November 16, 2021. https://www.nwcb.wa.gov/classes-of-noxious-weeds.

Section 3.6 – Wildlife and Habitat

Buehler, D. A. 2020. Bald Eagle (*Haliaeetus leucocephalus*), version 1.0. In: Poole, A.F., and F.B. Gill (eds.). Birds of the World. Cornell Lab of Ornithology, Ithaca, NY, USA. Accessed June 9, 2022. https://doi.org/10.2173/bow.baleag.01.

Cryan, P. M. 2003. Seasonal Distribution of Migratory Tree Bats (*Lasiurus and Lasionycteris*) in North America. Journal of Mammalogy, 84(2):579–593.

Dobler, F. C., J. Eby, C. Perry, S. Richardson, and M. Vander Haegen. 1996. Status of Washington's Shrub-steppe Ecosystem: Extent, Ownership, and Wildlife/Vegetation Relationships. Olympia: Washington Department of Fish and Wildlife Resources Report.

Fidorra, J., D. Blodgett, S. Bergh, C. Wickham, and R. Harris. 2019. Summary Report 2019: Pronghorn Antelope Abundance Survey in South-central Washington. Prepared for Yakama Nation and Wildlife Washington Department of Fish and Wildlife.

Fidorra, J. and T. C. Peterson. 2021. Summary Report. 2021: Pronghorn Antelope Abundance Survey in South-central Washington. Prepared for Yakama Nation Wildlife and Washington Department of Fish and Wildlife.

Gerber, B. D., J. F. Dwyer, S. A. Nesbitt, R. C. Drewien, C. D. Littlefield, T. C. Tacha, and P.A. Vohs. 2020. Sandhill Crane (*Antigone canadensis*), version 1.0. In: Poole, A.F. (ed.). Birds of the World. Cornell Lab of Ornithology, Ithaca, NY, USA. Accessed June 9, 2022. https://doi.org/10.2173/bow.sancra.01.

Giudice, J. H., and J. T. Ratti. 2020. Ring-necked Pheasant (*Phasianus colchicus*), version 1.0. In Birds of the World (S. M. Billerman, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. Accessed June 9, 2022. https://doi.org/10.2173/bow.rinphe.01.

Hayes, G. E. and J. W. Watson. 2021. Periodic Status Review for the Ferruginous Hawk. Washington Department of Fish and Wildlife, Olympia, Washington. 30+iii pp.

Horse Heaven Wind Farm, LLC. 2021a. Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification. EFSEC Docket Number: EF-210011. February 2021.

Horse Heaven Wind Farm, LLC. 2021b. Response from Tetra Tech to Data Request No.4; DEIS-1. submitted to the Washington Energy Facility Site Evaluation Council in support of Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification EFSEC Docket Number: EF-210011.

Johnson, D. H. and T. A. O'Neil. 2001. Wildlife-Habitat Relationships in Oregon and Washington. Corvallis, Oregon: Oregon State University Press.

Katzner, T. E., M. N. Kochert, K. Steenhof, C. L. McIntyre, E. H. Craig, and T. A. Miller. 2020. Golden Eagle (*Aquila chrysaetos*), version 2.0. In: Rodewald P.G. and B.K. Keeney (eds). Birds of the World. Cornell Lab of Ornithology, Ithaca, NY, USA. Accessed June 9, 2022. https://doi.org/10.2173/bow.goleag.02.

Knopf, F. L. and R. M. Evans. 2020. American White Pelican (*Pelecanus erythrorhynchos*), version 1.0. In: Poole, A.F. (ed.). Birds of the World. Cornell Lab of Ornithology, Ithaca, NY, USA. Accessed June 9, 2022. https://doi.org/10.2173/bow.amwpel.01.

Limpert, R. J., S. L. Earnst, C. Carboneras, and G. M. Kirwan. 2020. Tundra Swan (*Cygnus columbianus*), version 1.0. In: Billerman, S.M. (ed.). Birds of the World. Cornell Lab of Ornithology, Ithaca, NY, USA. Accessed June 9, 2022. https://doi.org/10.2173/bow.tunswa.01.

Martin, J. W. and B. A. Carlson. 2020. Sagebrush Sparrow (*Artemisiospiza nevadensis*), version 1.0. In: Poole, A.F. (ed.). Birds of the World. Cornell Lab of Ornithology, Ithaca, NY, USA. Accessed June 9, 2022. https://doi.org/10.2173/bow.sagspa1.01.

NatureMapping. Not dated. Washington Wildlife Distribution Maps. Washington NatureMapping Program. Accessed November 2021. http://naturemappingfoundation.org/natmap/maps/wa/.

NatureServe. 2021. NatureServe Explorer [web application]. NatureServe, Arlington, Virginia. Accessed November 2021. https://explorer.natureserve.org/.

Ng, J., M. D. Giovanni, M. J. Bechard, J. K. Schmutz, and P. Pyle. 2020. Ferruginous Hawk (*Buteo regalis*), version 1.0. In: Rodewald, P.G. (ed.). Birds of the World. Cornell Lab of Ornithology, Ithaca, NY, USA. Accessed June 9, 2022. https://doi.org/10.2173/bow.ferhaw.01.

Poulin, R. G., L. D. Todd, E. A. Haug, B. A. Millsap, and M. S. Martell. 2020. Burrowing Owl (*Athene cunicularia*), version 1.0. In: Poole, A.F. (ed.). Birds of the World. Cornell Lab of Ornithology, Ithaca, NY, USA. Accessed June 9, 2022. https://doi.org/10.2173/bow.burowl.01.

Reynolds, T. D., T. D. Rich, and D. A. Stephens. 2020. Sage Thrasher (*Oreoscoptes montanus*), version 1.0. In: Poole, A.F., and F.B. Gill (eds.). Birds of the World. Cornell Lab of Ornithology, Ithaca, NY, USA. Accessed June 9, 2022. https://doi.org/10.2173/bow.sagthr.01.

Ritter, M. 2022. Personal communication (teleconference) between M. Ritter, Washington Department of Fish and Wildlife and K. Moss, Golder Associates Ltd, March 10, 2022.

Schwitters, L., D. Schwitters, E. L. Bull, and C. T. Collins. 2021. Vaux's Swift (*Chaetura vauxi*), version 1.1. In: Rodewald, P.G. (ed.). Birds of the World. Cornell Lab of Ornithology, Ithaca, NY, USA. Accessed June 9, 2022. https://doi.org/10.2173/bow.vauswi.01.1.

Steenhof, K. 2020. Prairie Falcon (*Falco mexicanus*), version 1.0. In: Poole, A.F. (ed.). Birds of the World. Cornell Lab of Ornithology, Ithaca, NY, USA. Accessed June 9, 2022. https://doi.org/10.2173/bow.prafal.01.

Stephens, D. A. 1985. Foraging ecology of shrubsteppe birds in central Washington. Master's Thesis, Cent. Washington Univ., Ellensburg, WA.

Tetra Tech. 2021a. 2021 Botany and Habitat Survey Report for Horse Heaven Wind Farm. Prepared for Horse Heaven Wind Farm, LLC by Tetra Tech. August 2021.

Tetra Tech. 2021b. WDFW Data Request Regarding Potential Impacts to Pronghorn from Wind and Solar Energy Development at the Horse Heave Clean Energy Center, Benton County, Washington. Prepared for Scout Clean Energy.

Vennesland, R. G. and R. W. Butler. 2020. Great Blue Heron (*Ardea herodias*), version 1.0. In: Poole, A.F. (ed.). Birds of the World. Cornell Lab of Ornithology, Ithaca, NY, USA. Accessed June 9, 2022. https://doi.org/10.2173/bow.grbher3.01.

Watson, J. 2022a. Personal communication (teleconference) between J. Watson, Washington Department of Fish and Wildlife and K. Moss. Golder Associates Ltd, January 5, 2022.

Watson, J. 2022b. Personal communication (teleconference) between J. Watson, Washington Department of Fish and Wildlife and K. Moss. Golder Associates Ltd, February 3, 2022.

WDFW (Washington Department of Fish and Wildlife). 2008. Priority Habitat and Species List. 2021 Update. Olympia, Washington.

WDFW (Washington Department of Fish and Wildlife). 2009. Wind Power Guidelines. Olympia, Washington.

WDFW (Washington Department of Fish and Wildlife). 2015. Washington's State Wildlife Paction Plan: 2015 Update. Washington Department of Fish and Wildlife, Olympia Washington, USA.

WDFW (Washington Department of Fish and Wildlife). 2021a. At-risk Species. Accessed November 2021. https://wdfw.wa.gov/species-habitats/at-risk.

WDFW (Washington Department of Fish and Wildlife). 2021b. Northern sagebrush lizard (Sceloporus graciosus). Accessed November 2021. https://wdfw.wa.gov/species-habitats/species/sceloporus-graciosus#desc-range.

WDFW (Washington Department of Fish and Wildlife). 2021c. PHS on the Web [mapping tool]. Accessed November 2021. https://geodataservices.wdfw.wa.gov/hp/phs/.

WDFW (Washington Department of Fish and Wildlife). 2021d. Desert striped whipsnake (Coluber [Masticophis] taeniatus taeniatus). Accessed November 2021. https://wdfw.wa.gov/species-habitats/species/coluber-masticophis-taeniatus-taeniatus#desc-range.

WDFW (Washington Department of Fish and Wildlife). 2021e. American white pelican (*Pelecanus erythrorhynchos*). Accessed November 2021. https://wdfw.wa.gov/species-habitats/species/pelecanus-erythrorhynchos#desc-range.

WDFW (Washington Department of Fish and Wildlife). 2021f. Burrowing owl (*Athene cunicularia*). Accessed November 2021. https://wdfw.wa.gov/species-habitats/species/athene-cunicularia#desc-range.

WDFW (Washington Department of Fish and Wildlife). 2021g. Game Management Plan: July 2015–June 2021. Accessed November 2021. https://wdfw.wa.gov/publications/01676.

WDFW (Washington Department of Fish and Wildlife). 2021h. Ring-necked pheasant (*Phasianus colchicus*). Accessed November 2021. https://wdfw.wa.gov/species-habitats/species/phasianus-colchicus#desc-range.

WDFW (Washington Department of Fish and Wildlife). 2021i. Sagebrush sparrow (*Artemisiospiza nevadensis*). Accessed November 2021. https://wdfw.wa.gov/species-habitats/species/sceloporus-graciosus#desc-range.

WDFW (Washington Department of Fish and Wildlife). 2021j. Sage thrasher (*Oreoscoptes montanus*). Accessed November 2021. https://wdfw.wa.gov/species-habitats/species/oreoscoptes-montanus#desc-range.

WDFW (Washington Department of Fish and Wildlife). 2021k. Sandhill crane (*Antigone canadensis*). Accessed November 2021. https://wdfw.wa.gov/species-habitats/species/grus-canadensis#desc-range.

WDFW (Washington Department of Fish and Wildlife). 2021l. Black-tailed jackrabbit (*Lepus californicus*). Accessed November 2021. https://wdfw.wa.gov/species-habitats/species/lepus-californicus#desc-range.

WDFW (Washington Department of Fish and Wildlife). 2021m. Townsend's big-eared bat (*Corynorhinus townsendii*). Accessed November 2021. https://wdfw.wa.gov/species-habitats/species/corynorhinus-townsendii#desc-range.

WDFW (Washington Department of Fish and Wildlife). 2021n. Townsend's ground squirrel *(Urocitellus townsendii townsendii*). Accessed November 2021. https://wdfw.wa.gov/species-habitats/species/corynorhinus-townsendii#desc-range.

WDFW (Washington Department of Fish and Wildlife). 2021o. White-tailed jackrabbit (*Lepus townsendii*). Accessed November 2021. https://wdfw.wa.gov/species-habitats/species/lepus-townsendii#desc-range.

WDFW (Washington Department of Fish and Wildlife). 2021p. Pronghorn antelope (*Antilocapra americana*). Accessed November 2021. https://wdfw.wa.gov/species-habitats/species/antilocapra-americana#desc-range.

WDFW (Washington Department of Fish and Wildlife). 2022. Priority Habitat and Species at Risk. Accessed June 2022. https://wdfw.wa.gov/species-habitats/at-risk/phs/list.

WNHP (Washington Natural Heritage Program), Washington Department of Fish and Wildlife, U.S.D.I. Bureau of Land Management, and U.S. Forest Service. 2009. Washington Herp Atlas. Map products updated March 2017. Provisional PDF version of the website (2005-2019) created July 2019. 250 pp.

WHCWG (Washington Wildlife Habitat Connectivity Working Group). 2013. Columbia Plateau Ecoregion Connectivity Analysis Addendum: Habitat Connectivity Centrality, Pinch-points, and Barriers/Restoration Analyses. Washington's Department of Fish and Wildlife, and Department of Transportation, Olympia, Washington.

Yosef, R. 2020. Loggerhead Shrike (Lanius ludovicianus), version 1.0. In: Poole, A.F. and F.B. Gill (eds.). Birds of the World. Cornell Lab of Ornithology, Ithaca, NY, USA. Accessed June 9, 2022. https://doi.org/10.2173/bow.logshr.01.

Section 3.7 – Energy and Natural Resources

Benton PUD (Benton Public Utility District). 2021. 2020 Fast Facts. Accessed November 21, 2021. https://www.bentonpud.org/getattachment/About/Your-PUD/Overview/Fast-Facts/2020-Fast-Facts-Full-Document-updated-2021-10-05.pdf.aspx?lang=en-US.

Benton REA (Benton Rural Electric Authority). 2021. About Benton REA. Accessed November 21, 2021. https://bentonrea.org/about/about-benton-rea/.

City of Kennewick. 2017. Water Comprehensive Plan, Volume 1 of 2. Accessed November 17, 2021. https://www.go2kennewick.com/DocumentCenter/View/9775/2017-Water-Comp-Plan?bidId=.

DNR (Washington State Department of Natural Resources). 2022. Aggregate Resources. Accessed November 18, 2021.https://www.dnr.wa.gov/aggregate-resources!.

DOE (U.S. Department of Energy). Not dated. Alternative Fuels Data Center: Washington Transportation Data for Alternative Fuels and Vehicles. Accessed November 16, 2021. https://afdc.energy.gov/states/wa?menu=mi.

Ecology (Washington State Department of Ecology). Not dated. Accessed November 19, 2021. https://ecology.wa.gov/Water-Shorelines/Water-supply/Water-rights.

Energy Northwest. Not dated. Nine Canyon Wind Project. Accessed November 21, 2021. https://www.lcpud.org/wp-content/uploads/Nine_Canyon.pdf.

EIA (U.S. Energy Information Agency). 2020. Biofuels explained: Ethanol and Biomass-based Diesel. https://www.eia.gov/energyexplained/biofuels/. Accessed February 24, 2022.

EIA (U.S. Energy Information Agency). 2021. Washington State Profile and Energy Estimate: Profile Analysis Updated January 21, 2021. Accessed November 17, 2021. https://www.eia.gov/state/analysis.php?sid=WA.

EIA (U.S. Energy Information Agency). 2022. Washington State Profile and Energy Estimate: Quick Facts. https://www.eia.gov/state/?sid=WA. Accessed February 24, 2022.

Horse Heaven Wind Farm, LLC. 2021. Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification. EFSEC Docket Number: EF-210011. February 2021.

Northwest Power and Conservation Council. 2021. The 2021 Northwest Power Plan for a Secure & Affordable Energy Future Draft Plan Council Document 2021-5, September 2021. Accessed November 17, 2021. https://www.nwcouncil.org/sites/default/files/2021powerplan_2021-5.pdf.

Portland Cement Association. 2016. Washington Cement Industry. Accessed November 16, 2021. https://www.cement.org/docs/default-source/ga-pdfs/cement-industry-by-state-2015/washington.pdf?sfvrsn=2&sfvrsn=2.

Portland Cement Association. 2019. Accessed November 16, 2021. How Concrete is Made. https://www.cement.org/cement-concrete/how-concrete-is-made.

USGS (U.S. Geological Survey). 2020. 2017 Minerals Yearbook Sand and Gravel, Construction [Advance Release]. Accessed November 16, 2021. https://prd-wret.s3.us-west-2.amazonaws.com/assets/palladium/production/atoms/files/myb1-2017-sandc.pdf.

WAC (Washington Administrative Code). Chapter 463-60, Section 463-60-342. Natural environment—Energy and natural resources. Accessed December 2, 2022. https://app.leg.wa.gov/wac/default.aspx?cite=463-60-342.

Section 3.8 – Land and Shoreline Use

Benton County. 2017. Benton County Voluntary Stewardship Program, Chapter 3 March 2017 Agricultural Context. Accessed March 30, 2022. https://www.co.benton.wa.us/files/documents/VSPBentonCh3AgriContext3-27-17129123149032817PM.pdf.

Benton County. 2021a. 2017 Benton County Comprehensive Plan, Updated June 2021, Adopted February 13, 2018. Accessed May 31, 2022. https://co.benton.wa.us/pview.aspx?id=1425&catID=0&msclkid=16257c49af7a11ecba7ce7f595ff9205.

Benton County. 2021b. Benton County Shoreline Master Program. Locally Approved September 2021. Accessed March 29, 2022. https://www.co.benton.wa.us/pview.aspx?id=21044&catid=0

Benton County. 2021c. Codes, Plans and Policies. Accessed November 11, 2021. https://www.co.benton.wa.us/pview.aspx?id=20971&catid=0.

BERK. 2016. Memorandum: Agricultural Land & Critical Area Mapping Update. Accessed May 31, 2022. https://benton.municipalcms.com/files/documents/document129010710071916.pdf.

DNR (Washington State Department of Natural Resources). 2021. Forest and Trust Lands. Accessed November 3, 2021. https://www.dnr.wa.gov/managed-lands/forest-and-trust-lands.

Horse Heaven Wind Farm, LLC. 2021. Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification. EFSEC Docket Number: EF-210011. February 2021.

NRCS (United States Department of Agriculture Natural Resource Conservation Service). Not dated. Range & Pasture. Accessed March 30, 2022. https://www.nrcs.usda.gov/wps/portal/nrcs/main/wa/technical/landuse/pasture/.

RCW (Revised Code of Washington). Chapter 36.70A, Section 36.70A.040. Who must plan—Summary of requirements—Resolution for partial planning—Development regulations must implement comprehensive plans—Tribal participation. Accessed December 5, 2022. https://app.leg.wa.gov/RCW/default.aspx?cite=36.70A.040.

RCW (Revised Code of Washington). Chapter 90.58. Shoreline Management Act Of 1971. Accessed December 5, 2022. https://app.leg.wa.gov/rcw/default.aspx?cite=90.58.

RCW (Revised Code of Washington). Chapter 36.70A, Section 36.70A.070. Comprehensive plans—Mandatory elements. Accessed December 5, 2022. https://app.leg.wa.gov/rcw/default.aspx?cite=36.70a.070.

RCW (Revised Code of Washington). Chapter 36.70A, Section 36.70A.030. Definitions. Accessed December 5, 2022.

USDA (United States Department of Agriculture). 2019. Conservation Reserve Program Fact Sheet. Accessed November 3, 2021. https://www.fsa.usda.gov/Assets/USDA-FSA-Public/usdafiles/FactSheets/2019/conservation-reserve_program-fact_sheet.pdf.

WSU (Washington State University). 1992. Dryland Farming in the Northwestern United States, A Nontechnical Overview. Accessed March 30, 2022. https://smallfarms.oregonstate.edu/sites/agscid7/files/assets/dryland-farming-in-the-northwestern-united-states.pdf.

Section 3.9 – Historic and Cultural Resources

Ames, K. M., D. E. Dumond, J. R. Galm, and R. Minor. 1998. Prehistory of the Southern Plateau. Cited in In Plateau, edited by Deward E. Walker, Jr., pp. 103–119. Handbook of North American Indians, Vol. 12, William. C. Sturtevant, general editor, Smithsonian Institution, Washington, D.C. Cited in Davis, Jones, et al. 2021.

Beckham, S. D. 1998. History Since 1846. In Plateau, edited by Deward E. Walker, Jr., pp. 149–173. Handbook of North American Indians, Vol. 12, William C. Sturtevant, general editor, Smithsonian Institution, Washington, D.C. Cited in Davis, Jones, et al. 2021.

Brannan, N. F., and S. R. Clark. 2007. A Cultural Resources Survey for the Walla Walla Region 2007 Transmission Line Maintenance Project, Benton and Franklin Counties, Washington. Bonneville Power Administration, Portland, Oregon. Cited in Davis, Burk-Hise, and Henderson 2020.

CTUIR (Confederated Tribes of the Umatilla Indian Reservation). 2021. Traditional Use Study of the Horse Heaven Wind Farm Project, Benton County, Washington. Executive Summary.

DAHP (Department of Archaeological and Historic Preservation). 2003. Field Guide to Washington State Archaeology. Accessed January 13, 2022. https://dahp.wa.gov/archaeology.

DAHP (Department of Archaeological and Historic Preservation). 2022. Washington State Standards for Cultural Resources Reporting. Prepared by the Washington Department of Archaeological and Historic Preservation, Olympia. Accessed June 25, 2022, https://dahp.wa.gov/sites/default/files/CR%20Update%20March%202022_0.pdf.

Davis, S. J., K. Burk-Hise, and J. Henderson. 2020. Cultural Resources Investigations on Washington Department of Natural Resources Land for the Horse Heaven Wind Farm Project, Benton County, Washington. Prepared by Historical Research Associates, Inc., Portland, Oregon. Unpublished confidential document.

Davis, S. J., J. Jones, J. Henderson, L. Waldroop, and E. K. Ragsdale. 2020. Cultural Resources Investigations on Privately Owned Land for the Horse Heaven Wind Farm Project, Benton County, Washington. Draft report. Prepared by Historical Research Associates, Inc., Portland, Oregon. Unpublished confidential document.

Davis, S. J., J. Jones, J. Henderson, L. Waldroop, and E. K. Ragsdale. 2021. Cultural Resources Investigations on Privately Owned Land for the Horse Heaven Wind Farm Project, Benton County, Washington. Final report. Prepared by Historical Research Associates, Inc., Portland, Oregon. Unpublished confidential document.

Davis, S. J. and E. K. Ragsdale. 2020. Memorandum: Cultural Resources Investigations on Washington Department of Natural Resources Land for the Horse Heaven Wind Farm Project, Benton County, Washington-Addendum One. DAHP Project No. 2020-02-01333. Prepared by Historical Research Associates, Inc., Portland, Oregon. Unpublished confidential document.

Davis, S. J. and E. K. Ragsdale. 2021. Memorandum: Cultural Resources Investigations on Washington Department of Natural Resources Land for the Horse Heaven Wind Farm Project, Benton County, Washington—Addendum Two. DAHP Project No. 2020-02-01333. Prepared by Historical Research Associates, Inc., Portland, Oregon. Unpublished confidential document.

Davis, S. J., J. Tuck, K. Burk-Hise, J. Hopt, and E. K. Ragsdale. 2021. Cultural Resource Investigations on Privately Owned Land for the Horse Heaven Wind Farm Project, Benton County, Washington—Addendum One. Prepared by Historical Research Associates, Inc., Portland, Oregon. Unpublished confidential document.

GLO (Government Land Office).1872. Cadastral Survey Plat Map of Township 8 North, Range 27 East. Electronic document, http://www.glorecords.blm.gov. Cited in Davis and Ragsdale 2021.

Haines, F. 1970. Indians of the Great Basin and Plateau. G.P. Putnam's Sons, New York. Cited in Davis, Jones, et al. 2021.

Hardesty, D. L., and B. J. Little. 2000. Assessing Site Significance: A Guide for Archaeologists and Historians. Rowman & Littlefield, New York.

Hicks, B. A., and M. E. Morgenstein. 1994. Archaeological Studies in the Palouse Canyon Archaeological District: 1993 Field Season. BOAS Research Report No. 9212.2. Prepared for the Walla Walla District, U. S. Army Corps of Engineers. Cited in Davis, Jones, et al. 2021.

HistoricAerials.com. 1955. Aerial Photograph of the Kennewick Area. https://www.historicaerials.com/. Cited in Davis, Jones, et al. 2021 and Davis, Tuck, et al. 2021.

HistoricAerials.com. 1963. Aerial Photograph of the Kennewick Area. Electronic document. Accessed September 21, 2020. http://historicaerials.com. Cited in Davis, Tuck, et al. 2021.

HistoricAerials.com.1996. Aerial Photograph of the Kennewick Area. Electronic document. Accessed September 21, 2020. http://historicaerials.com. Cited in Davis, Tuck, et al. 2021.

Horse Heaven Wind Farm, LLC. 2021. Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification EFSEC Docket Number: EF-210011. February.

Hunn, Eugene S., with James Selam and Family. 1990. Nch'i-wána, "The Big River": Mid-Columbia Indians and Their Land. University of Washington Press, Seattle.

Kauhi, T. C., and J. L. Markert. 2009. Washington Statewide Archaeology Predictive Model Report. Prepared for Department of Archaeology and Historic Preservation by GeoEngineers, Inc., Tacoma, Washington. Statewide Archaeological Predictive Model File No. 15265-002-01 Accessed June 25, 2022. https://dahp.wa.gov/sites/default/files/predictive%20model%20report%202009.pdf.

Lahren, S. L., Jr. 1998. Reservations and Reserves. In Plateau, edited by Deward E. Walker, Jr., pp. 484–498. Handbook of North American Indians, Vol. 12, William C. Sturtevant, general editor, Smithsonian Institution, Washington, D.C. Cited in Davis, Burk-Hise, and Henderson 2020.

Leonhardy, F. C., and D. G. Rice. 1970. A Proposed Culture Typology for the Lower Snake River Region, Southeastern Washington. Northwest Anthropological Research Notes 4:1–29. Cited in Davis, Tuck, et al. 2021.

NPS (National Park Service). 1992. National Register Bulletin 38. Guidelines for Evaluating and Documenting Traditional Cultural Properties. Accessed February 2, 2022. https://www.nps.gov/subjects/nationalregister/upload/NRB38-Completeweb.pdf.

NPS (National Park Service). 1997. How to Apply the National Register Criteria for Evaluation. National Register Bulletin. U.S. Department of the Interior, National Park Service.

NPS (National Park Service). 2020. The Fight of 1877. Accessed May 5, 2022. https://www.nps.gov/nepe/learn/historyculture/1877.htm.

Quaempts, E. 2021. Personal communication (letter) between E. Quaempts, Director, Department of Natural Resources, Confederated Tribes of the Umatilla Indian Reservation, and Amy Moon, Energy Facility Site Specialist, EFSEC, April 09, 2021.

Randolph, J., and K. Boreson. 1975. Washington and Archaeological Research Center Archaeological and Paleontological Site Survey Form: 45BN205. On file with the Department of Archaeology and Historic Preservation, Olympia, Washington. Cited in Davis, Jones, et al. 2021.

RCW (Revised Code of Washington). Chapter 27.34, Section 27.34.220. Director—Powers. Accessed December 02, 2022. https://app.leg.wa.gov/rcw/default.aspx?cite=27.34.220.

RCW (Revised Code of Washington). Chapter 27.53, Section 27.53.060. Disturbing archaeological resource or site—Permit required—Conditions—Exceptions—Penalty. Accessed December 2, 2022. https://apps.leg.wa.gov/rcw/default.aspx?cite=27.53.060.

RCW (Revised Code of Washington). Chapter 27.53. Archaeological Sites and Resources. Accessed December 02, 2022. https://app.leg.wa.gov/rcw/default.aspx?cite=27.53.

Schuster, H. H. 1998. Yakima and Neighboring Groups. In Plateau, edited by Deward E. Walker, Jr., pp. 327–350. Handbook of North American Indians, Vol. 12, William C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C. Cited in Davis, Burk-Hise, and Henderson 2020.

Stern, T. 1998 Cayuse, Umatilla, and Walla Walla. In Plateau, edited by Deward E. Walker, Jr., pp. 395– 419. Handbook of North American Indians, vol. 12, William C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C. Cited in Davis, Jones, et al. 2021.

U.S. Department of Energy. 2022. Hanford History. Accessed May 3, 2022. https://www.hanford.gov/page.cfm/HanfordHistory.

USGS (U.S. Geological Survey). 1915. Prosser, Washington. 1:250,000 topographic quadrangle. Cited in Davis, Tuck, et al. 2021.

USGS (U.S. Geological Survey). 1917. Pasco, Washington. 1:250,000 topographic quadrangle. Electronic document. Accessed September 20, 2020. https://store.usgs.gov. Cited in Davis, Jones, et al. 2021, Davis, Tuck, et al. 2021.

USGS (U.S. Geological Survey). 1952a. Aerial Image No. A001000131554. Cited in Davis, Tuck, et al. 2021.

USGS (U.S. Geological Survey). 1953. Walla Walla, Washington. 1:250,000 topographic quadrangle. Electronic document, https://store.usgs.gov. Cited in Davis and Ragsdale 2021.

USGS (U.S. Geological Survey). 1963a. Aerial Image No. 1VARZ00020003. Cited in Davis, Tuck, et al. 2021.

USGS (U.S. Geological Survey). 1965a. Webber Canyon, Washington. 1:24,000 topographic quadrangle. Electronic document. Accessed September 20, 2020. https://store.usgs.gov. Cited in Davis, Tuck, et al. 2021.

Walker, D. E., Jr. 1998. Nez Perce. In Plateau, edited by Deward E. Walker, Jr., pp 420–438. Handbook of North American Indians, vol. 12, William C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C. Cited in Davis, Jones, et al. 2021.

WAC (Washington Administrative Code). Chapter 25-48, Section 25-48-020. Definitions. Accessed December 2, 2022. https://apps.leg.wa.gov/wac/default.aspx?cite=25-48-020.

WAC (Washington Administrative Code). Chapter 27.44, Indian Graves and Records. Accessed December 2, 2022. https://app.leg.wa.gov/rcw/default.aspx?cite=27.44.

Wilkerson, J., A. Brooks, and J. Williams. 2004. The Washington State Historic Preservation Plan: Strengthening Communities through Historic Preservation. Accessed January 13, 2022. http://www.dahp.wa.gov/sites/default/files/PreservationPlan04.pdf.

WISAARD (Washington Information System for Architectural and Archaeological Records Data). 2022a. Property ID: 722995 Grain Elevator. Washington Department of Archaeology and Historic Preservation. Accessed October 28, 2022. https://wisaard.dahp.wa.gov/Resource/703508/PropertyInventory/1628420.

WISAARD (Washington Information System for Architectural and Archaeological Records Data). 2022b. Property ID: 721665 McNary-Badger Canyon No. 1 Transmission Line. Washington Department of Archaeology and Historic Preservation. Accessed October 28, 2022. https://wisaard.dahp.wa.gov/Resource/700921/PropertyInventory/1641713.

WISAARD (Washington Information System for Architectural and Archaeological Records Data). 2022c. Property ID: 721666 McNary–Franklin No. 2 Transmission Line. Washington Department of Archaeology and Historic Preservation. Accessed October 28, 2022. https://wisaard.dahp.wa.gov/Resource/700922/PropertyInventory/1641715.

Section 3.10 – Visual Aspects, Light and Glare

Benton County. 2022. 2017 Comprehensive Plan, Updated April 2022. Adopted February 13, 2018. Amendments adopted by resolution January 14, 2020. Accessed September 15, 2022. https://www.co.benton.wa.us/files/documents/BentonCountyCompPlandApril1220221290257400705 22PM.pdf.

BLM (Bureau of Land Management). 1986. Visual Resource Contrast Rating. BLM Manual 8431. Accessed February 8, 2022. https://blmwyomingvisual.anl.gov/docs/BLM_VCR_8431.pdf.

BLM (Bureau of Land Management). 2022. Horse Heaven Hills Recreation Map. Accessed February 8, 2022. https://www.blm.gov/sites/blm.gov/files/orwa-horse-heaven-hills-map.pdf.

CESA (Clean Energy States Alliance). 2011. A Visual Impact Assessment Process for Wind Energy Projects. Accessed February 8, 2022. https://www.cesa.org/assets/2011-Files/States-Advancing-Wind-2/CESA-Visual-Impacts-Methodology-May2011.pdf.

CIE (Commission Internationale de l’Eclairage). 1997. Technical Report: Guidelines for Minimizing Sky Glow. Vienna, Austria: Commission Internationale de l’Eclairage Report No.: CIE 126: 1997, ISBN 978 3 900734 83 1.

CIE (Commission Internationale de l’Eclairage). 2003. Technical Report: Guide on the Limitation of the Effects of Obtrusive Light from Outdoor Installations. Vienna, Austria: Commission Internationale de l’Eclairage Report No.: CIE 150: 2003, ISBN 9788 3 901906 19 0.

EPA (U.S. Environmental Protection Agency). 2010. Level III and IV Ecoregions of Washington. Accessed February 8, 2022. https://gaftp.epa.gov/EPADataCommons/ORD/Ecoregions/wa/wa_eco.pdf.

FAA (Federal Aviation Administration). 2010. Technical Guidance for Evaluating Selected Solar Technologies on Airports. Office of Airports, Office of Airport Planning and Programming, Airport Planning and Environmental Division (APP-400). November.

FAA (Federal Aviation Administration). 2018. Advisory Circular No. 70/7460-1L, Obstruction Marking and Lighting, August 17, 2018.

FAA (Federal Aviation Administration). 2020. Notice Criteria Tool hosted by Federal Aviation Administration. Accessed March 2, 2022. https://oeaaa.faa.gov/oeaaa/external/gisTools/gisAction.jsp?action=showNoNoticeRequiredToolForm.

ForgeSolar. 2020. Sandia Solar Glare Hazard Analysis Tool, GlareGauge hosted by ForgeSolar. Accessed April 2022. https://www.forgesolar.com/.

Horse Heaven Wind Farm, LLC. 2021a. Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification. EFSEC Docket Number: EF-210011. February 2021.

Horse Heaven Wind Farm, LLC. 2021b. Aesthetics Technical Memorandum for the Horse Heaven Wind Farm Project. On file at SWCA Environmental Consultants, Salt Lake City, Utah.

Lampeter, Richard. 2011. Shadow Flicker Regulations and Guidance: New England and Beyond. Shadow Flicker Regulations and Guidance: New England and Beyond, February 10, 2011.

McGlinchey, D., and S. T. Caporossi. 2013. A Guide to Drafting Wind Turbine Regulations. Accessed September 15, 2022. https://www.manomet.org/wp-content/uploads/old-files/GuideToDraftingWindTurbineRegulations_Manomet_September2013.pdf.

NCSL (National Conference of State Legislatures). 2022. State Shut Out Light Pollution. Accessed May 5, 2022. https://www.ncsl.org/research/environment-and-natural-resources/states-shut-out-light-pollution.aspx.

NPS (National Park Service). 2014. Ice Age Floods National Geologic Trail Foundation Statement. Accessed February 8, 2022. https://www.nps.gov/iafl/learn/management/upload/IAFL_FD_2014-508s.pdf.

Sullivan, R. G., L. B. Kirchler, T. Lahti, S. Roché, K. Beckman, B. Cantwell, and P. Richmond. 2012. Wind Turbine Visibility and Visual Impact Threshold Distances in Western Landscapes. Accessed February 8, 2022. https://blmwyomingvisual.anl.gov/docs/WindVITD.pdf.

SWCA (SWCA Environmental Consultants). 2022. Horse Heaven Wind Farm Project Visual Impact Assessment Report. April 2022.

Section 3.11 – Noise and Vibration

Benton County. 2021. Codes, Plans and Policies. Accessed November 11, 2021. https://www.co.benton.wa.us/pview.aspx?id=20971&catid=0.

FTA (Federal Transit Administration). 2018. Transit Noise and Vibration Impact Assessment Manual, September 2018. https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf.

Horse Heaven Wind Farm, LLC. 2021. Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification. EFSEC Docket Number: EF-210011. February 2021.

Horse Heaven Wind Farm, LLC. 2022. Supplemental responses to Supplemental Data Request No.5; Noise-2. Submitted to the Washington Energy Facility Site Evaluation Council in support of Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification. EFSEC Docket Number: EF-210011.

Tetra Tech. 2021. Baseline Sound Survey Report, Benton County, Washington. Prepared by Tetra Tech for Horse Heaven Wind Farm, LLC. February 2021.

WAC (Washington Administrative Code). Chapter 173-60. Maximum Environmental Noise Levels. Accessed December 2, 2022. https://app.leg.wa.gov/wac/default.aspx?cite=173-60.

WAC (Washington Administrative Code). Chapter 173-60, Section 173-60-050. Exemptions. Accessed December 5, 2022. https://app.leg.wa.gov/wac/default.aspx?cite=173-60-050.

WAC (Washington Administrative Code). Chapter 463-60, Section 463-60-352. Built environment—Environmental health. Accessed December 5, 2022. https://app.leg.wa.gov/wac/default.aspx?cite=463-60-352.

Section 3.12 – Recreation

Benton County. 2021. 2017 Benton County Comprehensive Plan, Updated June 2021, Adopted February 13, 2018. Amendments adopted by resolution January 14, 2020. Accessed December 6, 2021. https://co.benton.wa.us/pview.aspx?id=1425&catID=0&msclkid=16257c49af7a11ecba7ce7f595ff9205.

Benton County. Not dated. Our Parks. County of Benton, Washington. Accessed November 30, 2021. https://www.co.benton.wa.us/pview.aspx?id=860&catid=0.

Benton County. 2022. Six-Year Transportation Improvement Program. Assessed May 16, 2022. https://www.co.benton.wa.us/pview.aspx?id=10589&catid=0.

BLM (Bureau of Land Management). Not dated. Juniper Dunes OHV Area. Accessed November 30, 2021. https://www.blm.gov/visit/juniper-dunes-wilderness.

DNR (Washington Department of Natural Resources). 2022. Recreation. Accessed November 30, 2021. https://www.dnr.wa.gov/recreation.

Horse Heaven Wind Farm, LLC. 2021a. Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification. EFSEC Docket Number: EF-210011. February 2021.

Horse Heaven Wind Farm, LLC. 2021b. Response to Data Request No. 2; Land and Shoreline Use-1 submitted to the Washington Energy Facility Site Evaluation Council in support of Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification. EFSEC Docket Number: EF-210011.

Horse Heaven Wind Farm, LLC. 2021c. Response to Data Request No. 3; Attachment Recreation-1 submitted to the Washington Energy Facility Site Evaluation Council in support of Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification. EFSEC Docket Number: EF-210011.

IAFI (Ice Age Floods Institute). 2021. Ice Age Floods National Geologic Trail. Accessed November 30, 2021. https://www.nps.gov/iafl/index.htm.

NPS (National Park Service). 2014. Ice Age Floods National Geologic Trail Foundation Statement. Accessed November 30, 2021. https://www.nps.gov/iafl/learn/management/upload/IAFL_FD_2014-508s.pdf.

ODFW (Oregon Department of Fish and Wildlife). 2008. Columbia Basin Wildlife Areas Management Plan. Accessed November 30, 2021. https://www.dfw.state.or.us/wildlife/management_plans/wildlife_areas/docs/columbia_basin.pdf.

ODFW (Oregon Department of Fish and Wildlife). 2022. Visit ODFW Wildlife Areas. Accessed November 30, 2021. https://myodfw.com/visit-odfw-wildlife-areas.

OSP (Oregon State Parks). 2022. Plan your trip to an Oregon State Park. https://stateparks.oregon.gov/index.cfm?do=park.profile&parkId=12.

Paragliding Forum. Not dated. Leonardo: The Global Flight Database. Takeoffs from Kiona. https://www.paraglidingforum.com/leonardo/page/filter.

Smith, Steve. 2021. Email correspondence between Steve Smith – BLM Spokane Office, Outdoor Recreation Planner and Rachel Katz – Tetra Tech, Environmental Planner. July 26, 2021.

USACE (U.S. Army Corps of Engineers). Not dated (a). Fishhook Park. Accessed November 30, 2021. https://www.nww.usace.army.mil/Missions/Recreation/Ice-Harbor-Dam-Lake-Sacajawea/Fishhook-Park/.

USACE (U.S. Army Corps of Engineers). Not dated (b). Charbonneau Park. Accessed November 30, 2021. https://www.nww.usace.army.mil/Missions/Recreation/Ice-Harbor-Dam-Lake-Sacajawea/Charbonneau/.

USACE (U.S. Army Corps of Engineers). Not dated (c). Sand Station Recreation Area. Accessed November 30, 2021. https://www.nww.usace.army.mil/Missions/Recreation/McNary-Dam-and-Lake- Wallula/Sand-Station-Recreation-Area-Lake-Wallula/.

USACE (U.S. Army Corps of Engineers). Not dated (d). Hood Park. Accessed November 30, 2021. https://www.nww.usace.army.mil/Missions/Recreation/McNary-Dam-and-Lake-Wallula/Hood-Park/.

USFWS (U.S. Fish and Wildlife Service). 2013a. Hanford Ranch. Accessed November 30, 2021. https://www.fws.gov/refuge/Hanford_Reach/Visit/Access.html.

USFWS (U.S. Fish and Wildlife Service). 2013b. Cold Springs. Accessed November 30, 2021. https://www.fws.gov/refuge/Cold_Springs/Visit/Plan_Visit.html.

USFWS (U.S. Fish and Wildlife Service). 2013c. Umatilla. Accessed November 30, 2021. https://www.fws.gov/refuge/Umatilla/Visit/Plan_YourVisit.html.

USFWS. (U.S. Fish and Wildlife Service). 2014. McNary. Accessed November 30, 2021. https://www.fws.gov/refuge/McNary/Visit/Plan_Your_Visit.html.

Washington State Parks. Not dated (a). Sacajawea Historical State Park. Accessed November 30, 2021. https://parks.state.wa.us/575/Sacajawea.

Washington State Parks. Not dated (b). Reservation Seasons. Accessed November 30, 2021. https://parks.state.wa.us/233/Reservation-seasons.

Section 3.13 – Public Health and Safety

Benton County, Washington. Not dated. Official website accessed December 2021: https://www.co.benton.wa.us/default.aspx

Horse Heaven Wind Farm, LLC. 2021. Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification. EFSEC Docket Number: EF-210011. February 2021.

Northwest Management, Inc. 2019. Benton County, Washington Natural Hazard Mitigation Plan 2019 Revision. Prepared for Benton County Emergency Management by Northwest Management Inc. Accessed December 28, 2021. https://www.co.benton.wa.us/files/documents/FinalCPAppendixNBentonCountyNaturalHazardMitigationPlan2019129055838061620PM.pdf.

Section 3.14 – Transportation

Benton County. 2021a. Benton County Comprehensive Plan. Updated June 2021, Adopted on February 13, 2018. Amendments adopted by resolution January 14, 2020. Appendix H – Transportation. Accessed December 28, 2021. https://www.co.benton.wa.us/pview.aspx?id=1425&catid=0.

Benton County. 2021b. 2022 – 2027 Six-Year Road Program. Accessed February 14, 2022. https://www.co.benton.wa.us/files/documents/2022-2027Six-YearRoadProgram1349042210110521PM.pdf.

County of Benton. Not dated. WSDOT Collision Data Jan 2011-2021. Accessed January 31, 2022. https://www.arcgis.com/apps/dashboards/017157c427134493852c26b0ad4a6daa.

Horse Heaven Wind Farm, LLC. 2021. Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification. EFSEC Docket Number: EF-210011. February 2021.

Kennewick Washington. Not dated. School Zones. Accessed January 20, 2022. https://www.go2kennewick.com/362/School-Zones.

Port of Benton. Not dated. About Us. Accessed: January 20, 2022. https://portofbenton.com/about-the-port/.

Port of Kalama. 2022. About the Port of Kalama. Accessed April 19, 2022. https://portofkalama.com/discover-port-of-kalama/about-the-port-of-kalama/.

Port of Kennewick. 2019. Marina. Accessed: January 20, 2022. https://www.portofkennewick.org/.

Port of Longview. Not dated. About. Accessed: February 10, 2022. https://www.portoflongview.com/27/About.

Port of Pasco. 2022. Port of Pasco History. Accessed: January 20, 2022. https://www.portofpasco.org/about-us/port-of-pasco-history.

Port of Vancouver USA. 2022. About. Accessed: February 10, 2022. https://www.portvanusa.com/about/.

RCW (Revised Code of Washington). Chapter 47.06, Section 47.06.140. Transportation facilities and services of statewide significance—Level of service standards. Accessed December 5, 2022. https://app.leg.wa.gov/rcw/default.aspx?cite=47.06.140.

RCW (Revised Code of Washington). Chapter 47.80, Section 47.80.030. Regional transportation plan—Contents, review, use. Accessed December 5, 2022. https://app.leg.wa.gov/rcw/default.aspx?cite=47.80.030.

RCW (Revised Code of Washington). Chapter 36.70A, Section 36.70A.070. Comprehensive plans—Mandatory elements. Accessed December 5, 2022. https://app.leg.wa.gov/rcw/default.aspx?cite=36.70a.070.

RCW (Revised Code of Washington). Chapter 36.81, Section 36.81.121. Perpetual advanced six-year plans for coordinated transportation program, expenditures—Nonmotorized transportation—Railroad right-of-way. Accessed December 5, 2022. https://app.leg.wa.gov/rcw/default.aspx?cite=36.81.121.

RCW (Revised Code of Washington). Chapter 46.61, Section 46.61.440. Maximum speed limit when passing school or playground crosswalks—Penalty, disposition of proceeds. Accessed December 5, 2022. https://app.leg.wa.gov/rcw/default.aspx?cite=46.61.440.

RCW (Revised Code of Washington). Chapter 87.03. Irrigation Districts Generally. Accessed December 5, 2022. https://apps.leg.wa.gov/rcw/default.aspx?cite=87.03.

TRB (Transportation Research Board). 2016. Highway Capacity Manual, Sixth Edition: A Guide for Multimodal Mobility Analysis. Transportation Research Board: Washington, D.C.

USDOT (U.S. Department of Transportation). Not dated. FRA – Safety Map. Accessed January 20, 2022. https://fragis.fra.dot.gov/GISFRASafety/.

UTC (Utilities and Transportation Commission). 2022. Crossing Accidents – UTC Database Records for the Calendar Year 2021. Provided via email by the Washington Energy Facility Site Evaluation Council to WSP USA, Inc., on May 12 2022.

Washington Ports. Not dated. Washington Public Ports Association. Accessed January 20, 2022. https://www.washingtonports.org/.

WSDOT (Washington State Department of Transportation). 2017. 2017 Washington State Freight System Plan. Accessed: January 31, 2022. https://wsdot.wa.gov/publications/fulltext/freight/Freight-Plan-2017SystemPlan.pdf.

WSDOT (Washington State Department of Transportation). 2019. Traffic GeoPortal. Accessed January 4, 2022. https://www.wsdot.wa.gov/data/tools/geoportal/?config=traffic.

WSDOT (Washington State Department of Transportation). 2020. Washington State Rail Plan 2019-2020. Accessed January 20, 2022. https://wsdot.wa.gov/sites/default/files/2021-10/2019-2040-State-Rail-Plan.pdf.

WSDOT (Washington State Department of Transportation). 2021a. Washington State Freight and Goods Transportation System (FGTS) 2021 Update. Accessed January 4, 2022. https://wsdot.wa.gov/sites/default/files/2021-12/2021-FGTS-update.pdf.

WSDOT (Washington State Department of Transportation). 2021b. WSDOT Freight Transportation System in WA. Accessed: January 31, 2022. https://wsdot.maps.arcgis.com/apps/webappviewer/index.html?id=0e37044a459244d9b6414826b46e8c46.

WSDOT (Washington State Department of Transportation). 2021c. WSDOT Level of Service Standard for State Routes. Accessed: January 4, 2022. https://geo.wa.gov/datasets/eb303de2bb4a4fc38c86195cdec03e4f_0?geometry=-121.240%2C45.767%2C-117.870%2C46.433.

Section 3.15 – Public Services and Utilities

Benton County. Not dated. Construction Waste. Accessed January 3, 2022. https://www.co.benton.wa.us/pview.aspx?id=9683&catID=0.

Benton County. 2014. 2013 Update Benton County Solid Waste and Moderate Risk Waste Plan – Final Draft. Accessed January 3, 2022. https://www.co.benton.wa.us/files/documents/document133022317111714.pdf.

Benton County. 2021. 2017 Benton County Comprehensive Plan, Updated June 2021, Adopted February 13, 2018. Amendments adopted by resolution January 14, 2020. Accessed November 3, 2021. https://co.benton.wa.us/pview.aspx?id=1425&catID=0&msclkid=16257c49af7a11ecba7ce7f595ff9205.

Benton-Franklin Health District. 2021. On-Site Sewage. Accessed January 3, 2022. https://www.bfhd.wa.gov/programs_services/waste_disposal/on-site_sewage.

City of Kennewick. 2017. Water Comprehensive Plan. February 2017. Accessed November 17, 2021. https://www.go2kennewick.com/DocumentCenter/View/9775/2017-Water-Comp-Plan?bidId= .

City of Richland, Washington. 2017. Request for Proposal (RFP) Title: Horn Rapids Landfill Gas-to-Fuel Project. Accessed January 3, 2022. https://www.epa.gov/sites/default/files/2019-05/documents/_lfge_rfp_online_submittal_final.pdf.

City of Richland, Washington. 2022. Horn Rapids Landfill. Accessed January 20, 2022. https://www.ci.richland.wa.us/departments/public-works/solid-waste-utility/horn-rapids-landfill.

Clark County, Washington. 2015. Clark County Solid Waste Management Plan 2015. Accessed January 3, 2022. https://clark.wa.gov/public-health/solid-waste-management-plan.

Horse Heaven Wind Farm, LLC. 2021. Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification. EFSEC Docket Number: EF-210011. February 2021.

RCW (Revised Code of Washington). Chapter 90.44, Section 90.44.050. Permit to withdraw. Accessed December 5, 2022. Permit to withdraw. https://app.leg.wa.gov/rcw/default.aspx?cite=90.44.050.

Waste Management. 2019. Columbia Ridge Landfill and Green Energy Plant. Accessed January 3, 2022. https://www.wmnorthwest.com/landfill/pdf/columbiaridge.pdf.

WAC (Washington Administrative Code). Chapter 463-60, Section 463-60-535. Socioeconomic impact. Accessed December 2, 2022. https://app.leg.wa.gov/wac/default.aspx?cite=463-60-535.

WAC (Washington Administrative Code). Chapter 173-518, Section 173-518-030. Definitions. Accessed December 2, 2022. https://app.leg.wa.gov/wac/default.aspx?cite=173-518-030.

WAC (Washington Administrative Code). Chapter 246-272A. On-Site Sewage Systems. Accessed December 2, 2022. https://app.leg.wa.gov/wac/default.aspx?cite=246-272a.

WAC (Washington Administrative Code). Chapter 246-272B. Large On-Site Sewage System Regulations. Accessed December 2, 2022. https://app.leg.wa.gov/wac/default.aspx?cite=246-272B.

WAC (Washington Administrative Code). Chapter 173-351. Criteria for Municipal Solid Waste Landfills. Accessed December 5, 2022. https://apps.leg.wa.gov/wac/default.aspx?cite=173-351.

Section 3.16 – Socioeconomics

BEA (U.S. Bureau of Economic Analysis). 2022a. Regional Data GDP and Personal Income. Employment by County, Metro, and Other Areas – 2020 Data. CAEMP25N Total Full-Time and Part-Time Employment by NAICS Industry 1. Accessed January 27, 2022. https://apps.bea.gov/iTable/iTable.cfm?reqid=70&step=1&acrdn=6.

BEA (U.S. Bureau of Economic Analysis). 2022b. Regional Data GDP and Personal Income. Employment by State – 2020 Data. SAEMP25N Total Full-Time and Part-Time Employment by NAICS Industry 1/. Accessed January 27, 2022. https://apps.bea.gov/iTable/iTable.cfm?reqid=70&step=1&acrdn=4.

Benton County. 2021a. Benton County Comprehensive Plan. Updated June 2021, Adopted on February 13, 2018. Amendments adopted by resolution January 14, 2020. Accessed November 3, 2021. https://www.co.benton.wa.us/pview.aspx?id=1425&catid=0.

Benton County. 2021b. Benton County Taxes for the Year 2021. Accessed February 4, 2022. https://www.co.benton.wa.us/files/documents/2021TaxBooklet211015652021121PM.pdf.

BFCOG (Benton-Franklin Council of Governments). 2021. 2021–2025 Comprehensive Economic Development Strategy (CEDS). Accessed January 25, 2022. https://static1.squarespace.com/static/60f0b327ca36d35991be43b4/t/621030d2c3789179e1fd605f/1645228252569/2021-CEDS-DRAFT-FINAL-26OCT21.pdf.

CEQ (Council on Environmental Quality). 1997. Environmental Justice Guidance Under the National Environmental Policy Act. Accessed February 22, 2022. https://www.energy.gov/sites/default/files/nepapub/nepa_documents/RedDont/G-CEQ-EJGuidance.pdf.

ECONorthwest. 2018. Columbia Point South – High-Level Feasibility Analysis. Prepared for the Port of Benton. March 26. Accessed March 1, 2022. https://www.ci.richland.wa.us/Home/ShowDocument?id=7614

EJScreen (Environmental Justice Screening and Mapping Tool). 2022. Accessed September 20, 2022. https://www.epa.gov/ejscreen

EPA (U.S. Environmental Protection Agency). 2016. Technical Guidance for Assessing Environmental Justice in Regulatory Analysis. Accessed March 2, 2022. https://www.epa.gov/sites/default/files/2016-06/documents/ejtg_5_6_16_v5.1.pdf.

FIWG (Federal Interagency Working Group). 2016. Promising Practices for EJ Methodologies in NEPA Reviews. Report of the Federal Interagency Working Group on Environmental Justice & NEPA Committee. Accessed September 1, 2022. https://www.epa.gov/sites/default/files/2016-08/documents/nepa_promising_practices_document_2016.pdf.

Horse Heaven Wind Farm, LLC. 2021. Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification. EFSEC Docket Number: EF-210011. February 2021.

Municipal Research and Services Center. 2022. Sales and Use Taxes in Washington State. Accessed February 4, 2022. https://mrsc.org/Home/Explore-Topics/Finance/Revenues/Sales-and-Use-Taxes.aspx#:~:text=just%20over%20%2425.)-,6.5%25%20State%20Sales%20Tax,sales%20taxes%20as%20described%20below.

NCES (National Center for Educational Statistics). 2022a. Data Tables. Accessed January 31, 2022. https://nces.ed.gov/ccd/tables/201920_summary_2.asp.

NCES (National Center for Educational Statistics). 2022b. District Details (2020–2021 school year; Fiscal data from 2017–2018). Accessed January 31, 2022. https://nces.ed.gov/ccd/districtsearch/index.asp?ID2=5309450.

OFM (Office of Financial Management). Not dated (a). Population Change: Natural Increase and Net Migration. Accessed February 16, 2022. Table Reviewed February 16, 2022. https://ofm.wa.gov/washington-data-research/statewide-data/washington-trends/population-changes/population-change-natural-increase-and-net-migration.

OFM (Office of Financial Management). Not dated (b). April 1 Official Population Estimates (Revised November 30, 2021). Accessed January 18, 2022. Table Reviewed February 16, 2022. https://ofm.wa.gov/washington-data-research/population-demographics/population-estimates/april-1-official-population-estimates.

OFM (Office of Financial Management). Not dated (c). Growth Management Act population projections for counties: 2010 to 2040. Accessed January 19, 2022. Table Reviewed February 16, 2022. https://ofm.wa.gov/washington-data-research/population-demographics/population-forecasts-and-projections/growth-management-act-county-projections/growth-management-act-population-projections-counties-2010-2040-0.

OFM (Office of Financial Management). Not dated (d). Population Density. Accessed January 18, 2022. Table Reviewed February 16, 2022. https://ofm.wa.gov/washington-data-research/population-demographics/population-estimates/population-density.

OFM (Office of Financial Management). Not dated (e). Components of Population Change. Accessed January 18, 2022. Table Reviewed February 16, 2022. https://ofm.wa.gov/washington-data-research/population-demographics/population-estimates/components-population-change.

OFM (Office of Financial Management). Not dated (f). Historical Estimates of April 1 Population and Housing for the State, Counties, and Cities. Accessed February 16, 2022. https://ofm.wa.gov/washington-data-research/population-demographics/population-estimates/historical-estimates-april-1-population-and-housing-state-counties-and-cities.

RCW (Revised Code of Washington). Chapter 70A02, Environmental Justice. Accessed September 20, 2022. https://app.leg.wa.gov/RCW/default.aspx?cite=70A.02.

RCW (Revised Code of Washington). Chapter 36.70A, Section 36.70A.010. Legislative findings. Accessed December 2, 2022. https://app.leg.wa.gov/rcw/default.aspx?cite=36.70A.010.

RCW (Revised Code of Washington). Chapter 36.70A, Section 36.70A.115. Comprehensive plans and development regulations must provide sufficient land capacity for development. Accessed December 2, 2022. https://app.leg.wa.gov/rcw/default.aspx?cite=36.70A.115.

RCW (Revised Code of Washington). Chapter 36.70A, Section 36.70A.040. Who must plan—Summary of requirements—Resolution for partial planning—Development regulations must implement comprehensive plans—Tribal participation. Accessed December 5, 2022. https://app.leg.wa.gov/RCW/default.aspx?cite=36.70A.040.

RCW (Revised Code of Washington). Chapter 43.62, Section 43.62.030. Determination of population—Cities and towns—Certificate—Allocation of state funds. Accessed December 5, 2022. https://app.leg.wa.gov/rcw/default.aspx?cite=43.62.030.

RCW (Revised Code of Washington). Chapter 70A.02, Section 70A.02.010. Definitions. Accessed December 5, 2022. https://app.leg.wa.gov/RCW/default.aspx?cite=70A.02.010.

RCW (Revised Code of Washington). Chapter 19.405, Section 19.405.020. Definitions. Accessed December 5, 2022. https://app.leg.wa.gov/RCW/default.aspx?cite=19.405.020.

RCW (Revised Code of Washington). Chapter 82.08, Section 82.08.020. Tax imposed—Retail sales—Retail car rental. Accessed December 5, 2022. https://app.leg.wa.gov/rcw/default.aspx?cite=82.08.020.

RCW (Revised Code of Washington). Chapter 82.08, Section 82.08.962. Exemptions—Sales of machinery and equipment used in generating electricity. Accessed December 5, 2022. https://app.leg.wa.gov/rcw/default.aspx?cite=82.08.962.

RCW (Revised Code of Washington). Chapter 82.12, Section 82.12.962. Exemptions—Use of machinery and equipment in generating electricity. Accessed December 2, 2022. https://apps.leg.wa.gov/rcw/default.aspx?cite=82.12.962.

RCW (Revised Code of Washington). Chapter 84.55, Section 84.55.010. Limitations prescribed. Accessed December 5, 2022. https://app.leg.wa.gov/rcw/default.aspx?cite=84.55.010.

U.S. Census Bureau (United States Census Bureau). 2020a. Metropolitan and Micropolitan - About. Last Revised November 22, 2021. Accessed March 11, 2022. https://www.census.gov/programs-surveys/metro-micro/about.html.

U.S. Census Bureau (United States Census Bureau). 2020b. 2019 American Community Survey 5-Year Estimates Subject Tables. Table Created January 24, 2022. https://data.census.gov/cedsci/table?g=0400000US53_0500000US53005,53021,53071,53077_1600000US5305560,5314485,5334575,5335275,5345180,5353545,5356450,5358235,5377665&d=ACS%205-Year%20Estimates%20Subject%20Tables&tid=ACSST5Y2019.S1901.

U.S. Census Bureau (United States Census Bureau). 2021a. 2020 Decennial Census. Explore Census Data – Advance Search – Geography. Table Created January 21, 2022. https://data.census.gov/cedsci/table?g=0400000US53_0500000US53005,53021,53071,53077_1600000US5305560,5314485,5334575,5335275,5345180,5353545,5356450,5358235,5377665&tid=DECENNIALPL2020.P2.

U.S. Census Bureau (United States Census Bureau). 2021b. Glossary. Accessed February 16, 2022. https://www.census.gov/programs-surveys/geography/about/glossary.html.

WAC (Washington Administrative Code). Chapter 463-60, Section 463-60-535. Socioeconomic impact. Accessed December 02, 2022. https://app.leg.wa.gov/wac/default.aspx?cite=463-60-535.

WAC (Washington Administrative Code). Chapter 197-11, Section 197-11-448. Relationship of EIS to other considerations. Accessed December 02, 2022. https://app.leg.wa.gov/wac/default.aspx?cite=197-11-448.

Washington State Auditor. 2020a. Financial Statements and Federal Single Audit Report Benton County For the period January 1, 2019 through December 31, 2019. Accessed January 28, 2022. https://portal.sao.wa.gov/ReportSearch/Home/ViewReportFile?arn=1027196&isFinding=false&sp=false.

Washington State Auditor. 2020b. Financial Statements and Federal Single Audit Report Franklin County For the period January 1, 2019 through December 31, 2019. Accessed January 28, 2022. https://portal.sao.wa.gov/ReportSearch/Home/ViewReportFile?arn=1027552&isFinding=false&sp=false.

Washington State Auditor. 2020c. Financial Statements and Federal Single Audit Report Walla Walla County For the period January 1, 2019 through December 31, 2019. Accessed January 28, 2022. https://portal.sao.wa.gov/ReportSearch/Home/ViewReportFile?arn=1027421&isFinding=false&sp=false.

Washington State Auditor. 2020d. Financial Statements and Federal Single Audit Report Yakima County for the Period January 1, 2020, through December 31, 2020. Accessed January 28, 2022. https://portal.sao.wa.gov/ReportSearch/Home/ViewReportFile?arn=1029066&isFinding=false&sp=false.

Washington State Department of Revenue. 2021. Local Sales & Use Tax Rates and Changes. November 5, 2021. Accessed February 4, 2022. https://dor.wa.gov/sites/default/files/legacy/Docs/forms/ExcsTx/LocSalUseTx/LSUFlyer_22_Q1.pdf.

6.5 Chapter 4 – Impacts and Mitigation Measures

Section 4.2 – Earth Resources

Benton County. 2019. Natural Hazard Mitigation Plan 2019 Revision. Accessed December 13, 2021. https://www.ci.benton-city.wa.us/files/documents/document1641113110081619.pdf.

GFZ (GFZ German Research Centre for Geosciences). 2017. Report – Volcanic Ash May Harm Solar Panels. Accessed February 1, 2022. https://www.gfz-potsdam.de/en/events/detail/article/report-volcanic-ash-may-harm-solar-panels/.

Horse Heaven Wind Farm, LLC. 2021. Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification. EFSEC Docket Number: EF-21001. February 2021.

WAC (Washington Administrative Code). Chapter 365-190, Section 365-190-120, Geologically hazardous areas. Accessed December 2, 2022. https://app.leg.wa.gov/wac/default.aspx?cite=365-190-120#:~:text=(1)%20Geologically%20hazardous%20areas.,in%20areas%20of%20significant%20hazard.

WAC (Washington Administrative Code). Chapter 463-62, Section 463-62-020, Seismicity. Accessed December 2, 2022. https://app.leg.wa.gov/wac/default.aspx?cite=463-62-020.

Westwood Professional Services. 2020. Preliminary Geotechnical Investigation Report – Horse Heaven Wind Project. June 5, 2020.

Section 4.3 – Air Quality

Ecology (Washington State Department of Ecology). 2020. 2017 Washington Comprehensive Emissions Inventory. Accessed December 15, 2021. https://apps.ecology.wa.gov/publications/SummaryPages/2002012.html.

Ecology (Washington State Department of Ecology). Not dated. Washington's Greenhouse Gas Inventory. Accessed December 15, 2021. https://ecology.wa.gov/Air-Climate/Climate-change/Tracking-greenhouse-gases/Greenhouse-gas-reporting/Inventories.

EPA (U.S. Department of Environmental Protection). 2016. Direct Emissions from Mobile Combustion Sources, U.S. EPA Center for Corporate Leadership – Greenhouse Gas Inventory Guidance, EPA 430-K-16-004, January 2016.

EPA (U.S. Department of Environmental Protection). 2021a. Latest Version of Motor Vehicle Emission Simulator (MOVES). Accessed December 15, 2021. https://www.epa.gov/moves/latest-version-motor-vehicle-emission-simulator-moves.

EPA (U.S. Department of Environmental Protection). 2021b. Compilation of Air Pollutant Emissions Factors (AP-42). Accessed December 15, 2021. https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emissions-factors.

ERG (Eastern Research Group). 2003. Documentation for Aircraft, Commercial Marine Vessel, Locomotive, and Other Nonroad Components of the National Emissions Inventory, Volume I – Methodology, October 7, 2003.

Horse Heaven Wind Farm, LLC. 2021a. Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification. EFSEC Docket Number: EF-210011. February 2021.

Horse Heaven Wind Farm, LLC 2021b. Response to Data Request No. 2; AIR-1 through AIR-13. Submitted to the Washington Energy Facility Site Evaluation Council in support of Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification. EFSEC Docket Number: EF-210011.

RCW (Revised Code of Washington). Chapter 70A.15, Washington Clean Air Act. Accessed December 2, 2022. https://apps.leg.wa.gov/rcw/default.aspx?cite=70A.15.

WAC (Washington Administrative Code). Chapter 173-476, Ambient Air Quality Standards. Accessed December 2, 2022. https://apps.leg.wa.gov/wac/default.aspx?cite=173-476.

WAC (Washington Administrative Code). Chapter 463-62, Section 463-62-070, Air quality. Accessed December 2, 2022. https://app.leg.wa.gov/WAc/default.aspx?cite=463-62-070.

WAC (Washington Administrative Code). Chapter 463-78, General and Operating Permit Regulations for Air Pollution Sources. Accessed December 2, 2022. https://app.leg.wa.gov/wAC/default.aspx?cite=463-78&full=true.

WAC (Washington Administrative Code). Chapter 173-400, General Regulations for Air Pollution Sources. Accessed December 2, 2022. https://apps.leg.wa.gov/wac/default.aspx?cite=173-400.

WAC (Washington Administrative Code). Chapter 463-78, Section 463-78-095, Permit issuance. Accessed December 2, 2022. https://app.leg.wa.gov/wac/default.aspx?cite=463-78-095.

WAC (Washington Administrative Code). Chapter 173-400, Section 173-400-040, General standards for maximum emissions. Accessed December 2, 2022. https://apps.leg.wa.gov/wac/default.aspx?cite=173-400-040.

WAC (Washington Administrative Code). Chapter 173-441, Reporting of Emissions of Greenhouse Gases. Accessed December 2, 2022. https://apps.leg.wa.gov/wac/default.aspx?cite=173-441.

WSU (Washington State University). 2017. The Tri-Cities Ozone Precursor Study (T-COPS) Final Report.

Section 4.4 – Water Resources

API (American Petroleum Institute). 2016.Options for Minimizing Environmental Impacts of Inland Spill Response. API Technical Report 425. October 2016. 102 pp.

Benton County. 2018. Benton County Code. Accessed January 21, 2022. https://www.co.benton.wa.us/pview.aspx?id=20971&catid=0.

Centre for Watershed Protection. 2003. Impacts of Impervious Cover on Aquatic Ecosystems. Watershed Protection Research Monograph No. 1. March 2003. https://clear.uconn.edu/projects/TMDL/library/papers/Schueler_2003.pdf.

City of Kennewick. 2020. Water Quality Report 2020. Accessed January 20, 2022. https://www.go2kennewick.com/DocumentCenter/View/723/Water-Quality---Consumer-Confidence-Report-CCR-PDF?bidId=.

Cook, L. M. and R.H. McCuen. 2013. Hydrologic Response of Solar Farms. Journal of Hydrologic Engineering 18(5):536–541.

Ecology (Washington State Department of Ecology). 1999. Sand and Gravel General Permit – Portable Facilities, Monitoring Plan, Employee Training, Stormwater Pollution Prevention Plan, Erosion and Sediment Control Plan, Spill Plan. November 1999. Publication Number 99-30. Accessed January 19, 2022. https://apps.ecology.wa.gov/publications/documents/9930.pdf.

Ecology (Washington State Department of Ecology). 2005. Critical Aquifer Recharge Areas Guidance Document. January 2005. Publication Number 05-10-028. Accessed January 19, 2022. https://apps.ecology.wa.gov/publications/parts/0510028part2.pdf.

Ecology (Washington State Department of Ecology). 2019. Stormwater Management Manual for Eastern Washington. Publication Number 18-10-044. August 2019. Accessed January 19, 2022. https://fortress.wa.gov/ecy/ezshare/wq/Permits/Flare/2019SWMMEW/Content/Resources/DocsForDownload/2019SWMMEW_8-13-19.pdf.

Ecology (Washington State Department of Ecology). 2020. Dangerous Waste Regulations Washington State Chapter 170-303 Washington Administrative Code. October 2020.

FEMA (Federal Emergency Management Agency). 2020. Benefits of Natural Floodplains. Accessed January 20, 2022. https://www.fema.gov/floodplain-management/wildlife-conservation/benefits-natural#:~:text=Natural%20floodplains%20provide%20flood%20risk,runoff%20and%20storing%20flood%20water.&text=Floodplains%20frequently%20contain%20wetlands%20and,quality%20of%20the%20local%20environment.

Horse Heaven Wind Farm, LLC. 2021a. Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification. EFSEC Docket Number: EF-210011. February 2021.

Horse Heaven Wind Farm, LLC. 2021b. Response from Tetra Tech to Data Request No.2; DEIS-1 submitted to the Washington Energy Facility Site Evaluation Council in support of Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification. EFSEC Docket Number: EF-210011.

Hruby, T. 2014. Washington State Wetland Rating System for Eastern Washington 2014 Update. SEA Program, Washington State Department of Ecology. Olympia, Washington.

Keestra, S. D., V. Geissen, K. Mosse, S. Piiranen, E. Scudiero, M. Leistra, and L. van Schiak. 2012. Soil As a Filter for Groundwater Quality. Current Opinion in Environmental Sustainability 4(5):507–516.

Levick, L., J. Fonseca, D. Goodrich, M. Hernandez, D. Semmens, J. Stromberg, R. Leidy, M. Scianni, D.P. Guertin, M. Tluczek, and W. Kepner. 2008. The Ecological and Hydrological Significance of Ephemeral and Intermittent Streams in the Arid and Semi-arid American Southwest. U.S. Environmental Protection Agency and USFA/ARS Southwest Watershed Research Center, https://www.epa.gov/sites/default/files/2015-03/documents/ephemeral_streams_report_final_508-kepner.pdf.

Nadeau, T. 2015. Streamflow Duration Assessment Method for the Pacific Northwest. EPA 910-K-14-001, U.S. Environmental Protection Agency, Region 10, Seattle, Washington.

RCW (Revised Code of Washington). Chapter 90.48, Water Pollution Control. Accessed December 2, 2022. https://app.leg.wa.gov/rcw/default.aspx?cite=90.48.

RCW (Revised Code of Washington). Chapter 77.55, Construction Projects in State Waters. Accessed December 2, 2022. https://app.leg.wa.gov/rcw/default.aspx?cite=77.55.

Ritter, J. 2012. Soil Erosion – Causes and Effects. Ontario Ministry of Agriculture, Food, and Rural Affairs.

Suchara, I. 2018. The Impact of Floods on the Structure and Functional Processes of Floodplain Ecosystems. Journal of Soil and Plant Biology 2019(1):44–60.

Sugiartha, N., I. G. N. Ardana, I. M. Sugina, I. B. G. Widiantara, I. N. Suparta, and I. K. Adi. 2019. Preliminary Design and Test of a Water Spray Solar Panel Cleaning System. Journal of Physics: Conference Series 1450 012108.

USDA (U.S. Department of Agriculture). 2009. Culvert Scour Assessment. Prepared by Inter-Fluve Inc. for US Forest Service. Accessed January 19, 2022. https://www.fs.fed.us/eng/pubs/pdf/CulvertScour/CulvertScourLo/%20Culvert_ScourLo.pdf.

USDA (U.S. Department of Agriculture). 2012. National Best Management Practices for Water Quality Management on National Forest System Lands. Volume 1: National Core BMP Technical Guide. April 2012.

Washington State Legislature. 2022a. RCW (Revised Code of Washington). Last Update February 14, 2022. Accessed May 6, 2022. https://app.leg.wa.gov/rcw/default.aspx.

Washington State Legislature. 2022b. Washington Administrative Code. Accessed January 19, 2022. https://apps.leg.wa.gov/wac/.

WDFW (Washington Department of Fish and Wildlife). 2008. Priority Habitat and Species List. Olympia, Washington.

WDFW (Washington Department of Fish and Wildlife). 2009. Wind Power Guidelines. Olympia, Washington. Accessed January 19, 2022. https://wdfw.wa.gov/sites/default/files/publications/00294/wdfw00294.pdf.

WDFW (Washington Department of Fish and Wildlife). 2018. Washington Department of Fish and Wildlife Times when Spawning and Incubating Salmonoids are least likely to be within Washington State Freshwaters. June 1, 2018. Accessed January 19, 2022. https://wdfw.wa.gov/sites/default/files/2019-02/freshwater_incubation_avoidance_times.pdf.

Section 4.5 – Vegetation

Farmer, A. M. 1991. The Effects of Dust on Vegetation – A Review. Environmental Pollution 79:63–75.

Gleason, S. M., D. T. Faucette, M. M. Toyofuku, C. A. Torres, and C. F. Bagley. 2007. Assessing and Mitigating the Effects of Windblown Soil on Rare and Common Vegetation. Environment Management 40:1016–1024.

Hansen, M. J., and A. P. Clevenger. 2005. The Influence of Disturbance and Habitat on the Presence of Non-native Plant Species along Transport Corridors. Biological Conservation 125:249–259.

Horse Heaven Wind Farm, LLC. 2021a. Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification. EFSEC Docket Number: EF-210011. February 2021.

Horse Heaven Wind Farm, LLC. 2021b. Response from Tetra Tech to Data Request No.4; DEIS-1 submitted to the Washington Energy Facility Site Evaluation Council in support of Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification. EFSEC Docket Number: EF-210011.

Horse Heaven Wind Farm, LLC. 2021c. Response to Data Request No.2 [Vegetation-1 through Vegetation-22] submitted to the Washington Energy Facility Site Evaluation Council in support of Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification. EFSEC Docket Number: EF-210011.

Knick, S. T., D. S. Dobkin, J. T. Rotenberry, M. A. Schroeder, W. M. Vander Haegen, and C. van Riper III. 2003. Teetering on the Edge or Too Late? Conservation and Research Issues for Avifauna of Sagebrush Habitats. The Condor 105 (4):611634.

Larsen, E., J. M. Azerrad, and N. Nordstorm. 2004. Management Recommendations for Washington’s priority species, Volume IV: Birds. Washington Department of Fish and Wildlife, Olympia, Washington, USA.

Moench, R. and J. Fusaro. 2012. Soil Erosion Control after Wildfire. Colorado State University Extension. Fact Sheet No. 6.308. Accessed December 20, 2021. https://extension.colostate.edu/docs/pubs/natres/06308.pdf.

Stone, D., H. Root, J. Hollinger, R. Rosentreter, A. Chandler, and J. Allen. 2020. *Texosporium sancti-jacobi,* Woven-spore Lichen. The IUCN Red List of Threatened Species. ISSN 2307-8235.

Swift, T.L. and S.J. Hannon. 2010. Critical Thresholds Associated with Habitat Loss: A Review of Concepts, Evidence, and Applications. Biological Review 85(1):35–53.

Tanner, K. E., K. A Moore-O’Leary, I. M. Parker, B. M. Pavlik, R. R. Hernandez. 2020. Simulated Solar Panels Create Altered Microhabitats in Desert Landforms. Ecosphere 11(4):e03089.

Tetra Tech. 2021. 2021 Botany and Habitat Survey Report for Horse Heaven Wind Farm. Prepared for Horse Heaven Sind Farm, LLC by Tetra Teck. August 2021.

Tetra Tech. 2022. Draft Habitat Mitigation Plan. Prepared for Horse Heaven Wind Farm, LLC by Tetra Tech. Submitted February 2021. Revised February 2022.

USFWS (U. S. Fish and Wildlife Service). 2012. Land-Based Wind Energy Guidelines. March 23, 2012. 82 pp. Accessed January 14, 2022. http://www.fws.gov/cno/pdf/Energy/2012_Wind_Energy_Guidelines_final.pdf.

USFWS (U.S. Fish and Wildlife Service). 2013. Eagle Conservation Plan Guidance: Module 1 - Land-Based Wind Energy, Version 2. U.S. Department of the Interior, Fish and Wildlife Service, Division of Migratory Bird Management. April 2013. Accessed January 14, 2022. https://www.fws.gov/migratorybirds/pdf/management/eagleconservationplanguidance.pdf.

USFWS (U.S. Fish and Wildlife Service). 2016. Eagle Permits; Revisions to Regulations for Eagle Incidental Take and Take of Eagle Nests. Final Rule. *Federal Register* 81(242): 91494-91554. December 16, 2016.

USGS (U.S. Geological Survey). 2018. Restoration Handbook for Sagebrush Steppe Ecosystems with Emphasis on Greater Sage-Grouse Habitat – Part 3. Site Level Restoration Decisions. U.S. Department of the Interior and U.S. Geological Survey. Version 1.1 March 2018.

WDFW (Washington Department of Fish and Wildlife). 2008. Priority Habitat and Species List. Olympia, Washington. 292 pp.

WDFW (Washington Department of Fish and Wildlife). 2009. Wind Power Guidelines. Olympia, Washington. https://wdfw.wa.gov/sites/default/files/publications/00294/wdfw00294.pdf.

WDFW (Washington Department of Fish and Wildlife). 2011. Management Recommendations for Washington's Priority Habitats: Managing Shrub-steppe in Developing Landscapes. Washington Department of Fish and Wildlife. Olympia, Washington.

WDFW (Washington Department of Fish and Wildlife). 2022. Shrubsteppe. Accessed April 13, 2022. https://wdfw.wa.gov/species-habitats/ecosystems/shrubsteppe#:~:text=The%20shrubsteppe%20is%20an%20arid,sagebrush%20sparrow%2C%20and%20burrowing%20owl.

Weidenhamer, J. D., and R. M. Callaway. 2010. Direct and Indirect Effects of Invasive Plants on Soil Chemistry and Ecosystem Function. Journal of Chemical Ecology 36:59–69.

Section 4.6 – Wildlife and Habitat

APLIC (Avian Power Line Interaction Committee). 2006. Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006. Public Interest Energy Research Program (PIER) Final Project Report CEC-500-2006-022. Edison Electric Institute, APLIC, and the California Energy Commission. Washington D.C. and Sacramento, California.

APLIC (Avian Power Line Interaction Committee). 2012. Reducing Avian Collisions with Power Lines: The State of the Art in 2012. Edison Electric Institute and APLIC, Washington D.C.

Arnett, E. B., D. B. Inkley, D. H. Johnson, R. P. Larkin, S. Manes, A. M. Manville, J. R. Mason, M. L. Morrison, M. D. Strickland, and R. Thresher. 2007. Impacts of Wind Energy Facilities on Wildlife and Wildlife Habitat. Wildlife Society Technical Review 7-2. The Wildlife Society, Bethesda, Maryland, USA.

AWWI (American Wind Wildlife Institute). 2020. AWWI Technical Report: 2nd Edition: Summary of Bird Fatality Monitoring Data Contained in AWWIC. Washington, D.C. November 24, 2020. Accessed June 9, 2022. https://rewi.org/wp-content/uploads/2020/11/2nd-Edition-AWWIC-Bird-Report-11-24-2020.pdf.

Barclay, R. M. R., E. F. Baerwald, and J. C. Gruver. 2007. Variation in Bat and Bird Fatalities at Wind Energy Facilities: Assessing the Effects of Rotor Size and Tower Height. Canadian Journal of Zoology 85:381–387.

Barré, K., R. Julliard, I. Le Viol, Y. Bas, and C. Kerbiriou, 2017. Impact of Wind Turbines on Bat Activity: An Omitted Long-distance Concern. 10.13140/RG.2.2.19411.99363.

Beason, R. C. 2020. Horned Lark (*Eremophila alpestris*), version 1.0. In Birds of the World (S. M. Billerman, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. Accessed June 9, 2022. https://doi.org/10.2173/bow.horlar.01.

Benítez-López, A., R. Alkemade, and P. A. Verweij. 2010. Are Mammal and Bird Populations Declining in the Proximity of Roads and Other Infrastructure? CEE review 09-007 (SR68). Collaboration for Environmental Evidence. Accessed June 9, 2022. www.environmentalevidence.org/SR68.html.

Berger, R. P. 1995. Fur, Feathers and Transmission Lines – How Rights of Way Affect Wildlife (p. 56). Prepared by Wildlife Resource Consulting Services Inc. for Manitoba Hydro, System Planning and Environment Division. Winnipeg, Manitoba.

Bradshaw, C. J. A., S. Boutin, and D. M. Hebert. 1997. Effects of Petroleum Exploration on Woodland Caribou in Northeastern Alberta. Journal of Wildlife Management 61:1127–1133.

Bromley, M. 1985. Wildlife Management Implication of Petroleum Exploration and Development in Wildlands Environments (9.42). USDA Forest Service. General Technical Report INT-191.

Chock, R. Y., B. Clucas, E. K. Peterson, B. F. Blackwell, D. T Blumstein, K. Church, E. Fernadez-Juricic, G. Francescoli, A. Greggor, P. Kemp, G. M. Pinho, P. M Sanzenbacher, B. A. Schulte, and P. Toni. 2020. Evaluating Potential Effects of Solar Power Facilities on Wildlife from an Animal Behaviour Perspective. Conservation Science and Practice.

Connell, J. H., J. G. Tracey, and J. L. Webb. 1984. Compensatory Recruitment, Growth, and Mortality as Factors Maintaining Rain Forest Tree Diversity. Ecological Monographs 54(2):141–164.

D'Amico, M., R. C. Martins, J. M. Alvarez-Martinez, M. Porto, R. Barrientos, and F. Moreia. 2019. Bird Collisions with Power Lines: Prioritizing Species and Areas by Estimating Potential Population-level Impacts. Diversity and Distribution 25(6):975–982.

Drewitt, A. L. and R. H. W. Langston. 2006. Assessing the Impacts of Wind Farms on Birds. Ibis 148:29–42.

Erickson, W. P., J. Jeffrey, K. Kronner, and K. Bay. 2004. Stateline Wind Project Wildlife Monitoring Final Report: July 2001 – December 2003. Western EcoSystem Technology Inc., Cheyenne, Wyoming, and Northwest Wildlife Consultants, Inc. Pendleton, Oregon.

Erickson, W., K. Kronner, and B. Gritski. 2003. Nine Canyon Wind Power Project Avian and Bat Monitoring Report September 2002 – August 2003. Prepared for Nine Canyon Technical Advisory Committee Energy Northwest. October 2003. Accessed June 9, 2020. https://tethys.pnnl.gov/sites/default/files/publications/Erickson-WEST-2003.pdf.

Erickson, W. P., M. M. Wolfe, K. J. Bay, D. H Johnson, and J. L. Gehring. 2014. A Comprehensive Analysis of Small-Passerine Fatalities from Collision with Turbines at Wind Energy Facilities. PLoS One 9(9):e107491.

Falavigna, T. J., D. Pereira, M. L. Rippel, and M. V. Petry. 2020 Changes in Bird Species Composition after a Wind Farm Installation: A Case Study in South America. Environmental Impact Assessment Review 83.

FAA (Federal Aviation Administration). 2020. Obstruction Marking and Lighting. Advisory Circular AC 0/7460-1M. U.S. Department of Transportation, FAA. November 16, 2020. Accessed June 9, 2022. https://www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/document.current/documentNumber/70_7460-1.

Fidorra, J., D. Blodgett, S. Bergh, C. Wickham, and R. Harris. 2019. Summary Report 2019: Pronghorn Antelope Abundance Survey in South-central Washington. Prepared for Yakama Nation and Wildlife Washington Department of Fish and Wildlife.

Fidorra, J. and T. C. Peterson. 2021. Summary Report 2021: Pronghorn Antelope Abundance Survey in South-Central Washington. Prepared for Yakama Nation and Wildlife Washington Department of Fish and Wildlife.

Forman, R. T., B. Reineking, and A. M. Hersperger. 2002. Road Traffic and Nearby Grassland Bird Patterns in a Suburbanizing Landscape. Environmental Management. 29(6):782–800.

Frick, W. F., E. F. Baerwalk, J. F. Pollock, R. M. R. Barclay, J. A. Szymanski, T. J. Weller, A. L. Russell, S.C. Loeb, R.A. Medellin, and L. P. McGuire. 2017. Fatalities at Wind Turbines May Threaten Population Viability of a Migratory Bat. Biological Conservation 209:172–177.

Fukumoto, J. and S. Herrero. 1998. Observations of the Long-toed Salamander, *Ambystoma macrodactylum*, in Waterton Lakes National Park, Alberta. Canadian Field-Naturalist 112(4):579–585.

Garshelis, D. L. 2000. Delusions in Habitat Evaluation: Measuring Use, Selection and Importance. In: Boitani, L. and T.K. Fuller (eds.), Research Techniques in Animal Ecology: Controversies and Consequences. Columbia University Press, New York, NY. 111–164.

Garvin, J. C., C. S. Jennelle, D. Drake, and S. M Grodsky. 2011. Response of Raptors to a Windfarm. Journal of Applied Ecology (45):199–209.

Gerber, B. D., J. F. Dwyer, S. A. Nesbitt, R. C. Drewien, C. D. Littlefield, T. C. Tacha, and P. A. Vohs. 2020. Sandhill Crane (*Antigone canadensis*), version 1.0. In Birds of the World (A. F. Poole, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.sancra.01.

Giudice, J. H. and J. T. Ratti. 2020. Ring-necked Pheasant (*Phasianus colchicus*), version 1.0. In Birds of the World (S. M. Billerman, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. Accessed June 9, 2022. https://doi.org/10.2173/bow.rinphe.01.

GAL (Golder Associates Ltd.). 2022. Wind Turbine Wildlife Collison Risk Assessment: Horse Heaven Wind Farm. Prepared for Washington Energy Facility Site Evaluation Council.

Greif, S. and B. M. Siemers. 2010. Innate Recognition of Water bodies in Echolocating Bats. Nature Communications. 2(1):107.

Gruver, J. C. and D. A. Keinath. 2006. Townsend's Big-eared Bat (*Corynorhinus townsendii*): A Technical Conservation Assessment. Prepared for the USDA Forest Service, Rocky Mountain Region, Species Conservation Project. October 25, 2006. Accessed June 9, 2022. https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5181908.pdf.

Gunson, K. E., B. Chruszcz, and A. P. Clevenger. 2004. Large Animal-Vehicle Collisions in the Central Canadian Rocky Mountains: Patterns and Characteristics. In: Irwin, C. L., P. Garett and K. P. Mcdermott (eds.), Proceedings of the 2003 International Conference on Ecology And Transportation. Center for Transportation and the Environment, North Carolina State University, Raleigh, North Carolina: 355–366.

Habib, L., E. M. Bayne, and S. Boutin. 2007. Chronic Industrial Noise Affects Pairing Success and Age Structure of Ovenbirds. Journal of Applied Ecology 44:176–184.

Hammerson, G. and S. Cannings. 2022. NatureServe: Bald Eagle. NatureServe Explorer.

Hayes, G. E. and J. W. Watson. 2021. Periodic Status Review for the Ferruginous Hawk. Washington Department of Fish and Wildlife, Olympia, Washington. 30+iii pp.

Hein, C. and M. Schirmacher. 2016. Impact of Wind Energy on Bats: A Summary of Our Current Knowledge. Human–Wildlife Interactions 10(1):19–27.

Horse Heaven Wind Farm, LLC. 2021a. Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification. EFSEC Docket Number: EF-210011. February.

Horse Heaven Wind Farm, LLC. 2021b. Response from Tetra Tech to Data Request No.4; [DEIS-1] submitted to the Washington Energy Facility Site Evaluation Council in support of Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification EFSEC Docket Number: EF-210011.

Horse Heaven Wind Farm, LLC. 2021c. Response to Data Request No.2; [Wildlife-2] submitted to the Washington Energy Facility Site Evaluation Council in support of Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification EFSEC Docket Number: EF-210011.

Horse Heaven Wind Farm, LLC. 2021d. Response to Data Request No.1; [Hab-11 to Hab-15] submitted to the Washington Energy Facility Site Evaluation Council in support of Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification EFSEC Docket Number: EF-210011.

Jalkotzy, M. G., P. I. Ross, and M. D. Nasserden. 1997. The Effects of Linear Developments on Wildlife: A Review of Selected Scientific Literature. Prepared for the Canadian Association of Petroleum Producers. ARC Wildlife Services Ltd. 115 pp.

Johnson, G. D., W. P. Erickson, M. D. Strickland, M. F. Shepherd, and D. A. Shepherd. 2000. Avian Monitoring Studies at the Buffalo Ridge Wind Resource Area, Minnesota: Results of a Four-year Study. Technical report prepared for Northern States Power Co., Minneapolis, Minnesota. Western Ecosystems Technology, Inc., Cheyenne, Wyoming, USA.

Johnson, D. H. and T. A. O'Neil. 2001. Wildlife-habitat Relationships in Oregon and Washington. Oregon State University Press. Corvallis, Oregon.

Johnson, G. D., W. P. Erickson, and J. White. 2003. Avian and Bat Mortality at the Klondike, Oregon, Phase I Wind Plant, Sherman County, Oregon. Technical Report prepared for Northwestern Wind Power. Western Ecosystems Technology, Inc., Cheyenne, Wyoming, USA.

Katzner, T. E., M. N. Kochert, K. Steenhof, C. L. McIntyre, E. H. Craig, and T. A. Miller. 2020. Golden Eagle (*Aquila chrysaetos*), version 2.0. In Birds of the World (P. G. Rodewald and B. K. Keeney, Editors). Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.goleag.02.

Keehn, J., K. Shoemaker, and C. Feldman. 2019. Population-Level Effects of Wind Farms on a Desert Lizard. Journal of Wildlife Management 83(1):145–157. DOI: 10.1002/jwmg.21565.

Kempenaers, B., P. Borgstro, P. Loe, E. Schlicht, and M. Valcu. 2010. Artificial Night Lighting Affects Dawn Song, Extra-pair Siring Success, and Lay Date in Songbirds. Current Biology 20:1735–1739.

Knick, S. T., D. S. Dobkin, J. T. Rotenberry, M. A. Schroeder, W. M. Vander Haegen, C. Van Riper III. 2003. Teetering on the Edge or Too Late? Conservation and Research Issues for Avifauna of Sagebrush Habitats. The Condor 105: 611–634.

Kolar, P. and M. Bechard. 2016. Wind Energy, Nest Success, and Post-fledging Survival of Buteo Hawks. Journal of Wildlife Management 80(7):1242–1255. https://doi.org/10.1002/jwmg.21125.

Kosciuch, K., D. Riser-Espinoza, M. Gerringer, and W. Erickson. 2020. A Summary of Bird Mortality at Photovoltaic Utility Solar Facilities in the Southwestern U.S. PLoS ONE 15(4): e0232034.

Kroeger, S. B., H. M. Hanslin, T. Lennartsson, M. D'Amico, J. Kollmann, C. Fischer, E. Albertsen, and J. D. M. Speed. 2021. Impacts of Roads on Bird Species Richness: A Meta-analysis Considering Road Types, Habitats and Feeding Guilds. Science of the Total Environment.

Landon, D. M., P. R. Krausman, K. K. G. Koenen, and L. K. Harris. 2000. Pronghorn Use of Areas with Varying Sound Pressure Levels. The Southwestern Naturalist 45(4):725–728.

Larsen, E. M., editor. 1997. Management Recommendations for Washington's Priority Species, Volume III: Amphibians and Reptiles. Washington Department of Fish and Wildlife. Olympia, Washington. 122pp.

Larsen, J. and K. Madsen. 2000. Effects of Wind Turbines and Other Physical Elements on Field Utilization by Pink-footed Geese *(Anser brachyrhynchus*): A Landscape Perspective. Landscape Ecology 15:755–764. 10.1023/A:1008127702944.

Larsen, E., J. M. Azerrad, and N. Nordstrom, editors. 2004. Management Recommendations for Washington's Priority Species, Volume IV: Birds. Washington Department of Fish and Wildlife, Olympia, Washington, USA.

Leddy, K. L. 1996. Effects of Wind Turbines on Non-game Birds in Conservation Reserve Program Grasslands in South-western Minnesota. Thesis. South Dakota State University, Brookings, South Dakota, USA.

Leddy, K. L., K. F. Higgins, and D. E. Naugle. 1999. Effects of Wind Turbines on Upland Nesting Birds in Conservation Reserve Program grasslands. Wilson Bulletin 111:100–104.

Lehman, R. N., J. Savidge, P. L. Kennedy, and R. E. Harness. 2010. Raptor Electrocution Rates for a Utility in the Intermountain Western United States. Journal of Wildlife Management 74(3): 459–470.

Lengagne, T. 2008. Traffic Noise Affects Communication Behavior in a Breeding Anuran, *Hyla arborea*. Biological Conservation 141(8):2023–2031.

Leu, M., S. E. Hanser, C. L. Aldridge, S. E. Nielsen, L. H. Suring, and S. T. Knick. 2011. Chapter 8: Occurrence of Large and Medium-Sized Mammals: Occurrences But Not Count Models Predict Pronghorn Distribution in Sagebrush Ecosystem Conservation and Management: 315–336.

Limpert, R. J., S. L. Earnst, C. Carboneras, and G. M. Kirwan .2020. Tundra Swan (*Cygnus columbianus*), version 1.0. In Birds of the World (S. M. Billerman, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. Accessed June 9, 2022. https://doi.org/10.2173/bow.tunswa.01.

Lopucki, R., D. Klich, and S. Gielarek. 2017. Do Terrestrial Animals Avoid Areas Close to Turbines in Functioning Wind Farms in Agricultural Landscapes? Environmental Monitoring and Assessment 189(7):343.

Lopucki, R., D. Klich, A. Scibior, D. Golebiowska, and K. Perzanowski. 2018. Living in Habitats Affected by Wind Turbines May Result in an Increase in Corticosterone Levels in Ground Dwelling Animals. Ecological Indicators 84(2018):165–171.

Loss, S.R., T. Will, and P. P. Marra. 2014. Refining Estimates of Bird Collision and Electrocution Mortality at Power Lines in the United States. PLoS ONE 9(7): e101565. doi:10.1371/journal.pone.0101565

Lovich, J. E. and J. R. Ennen. 2011. Wildlife Conservation and Solar Energy Development in the Desert Southwest, United States. BioScience 61:982–992.

MacPherson, D., J. Macpherson, and P. Morris. 2011. Rural Roads as Barriers to the Movements of Small Mammals. Applied Ecology and Environmental Research 9:167–180.

Manci, K. M., D. N. Gladwin, R. Villella, and M. G. Cavendish. 1988. Effects of Aircraft Noise and Sonic Booms on Domestic Animals and Wildlife: A Literature Synthesis. U.S. Department of the Interior, Fish and Wildlife Service, National Ecology Research Center. Fort Collins, Colorado.

Martin, J. W. and B. A. Carlson. 2020. Sagebrush Sparrow (*Artemisiospiza nevadensis*), version 1.0. In Birds of the World (A. F. Poole, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. Accessed June 9, 2022. https://doi.org/10.2173/bow.sagspa1.01.

Meffe, G. K. and C. R. Carroll. 1994. Principles of Conservation Biology. Sinauer Associates, Inc., Sunderland, Massachusetts. 600 pp.

Morelli, F., M. Beim, L. Jerzak, D. Jones, and P. Tryjanowski. 2014 Can Roads, Railways and Related Structures Have Positive Effects on Birds? – A review, Transportation Research Part D: Transport and Environment 30:21–31.

Muhly, T. B., C. Semeniuk, A. Massolo, L. Hickman, and M. Musiani. 2011. Human Activity Helps Prey Win the Predator-Prey Space Race. PLoS ONE 6(3): e17050. doi:10.1371/journal.pone.0017050.

Nagy, L., B. Gibson, K. Kosciuch, and J. Taylor, B. Gunderman. 2012. Whooping Crane and Sandhill Crane Behaviour at an Operating Wind Farm. Poster presentation. National Wind Coordinating Collaborative. Wind Wildlife Research Meeting IX. Broomfield, Colorado. November 28–30, 2012.

NatureMapping. Not dated. GAP Analysis Predicted Distribution Maps. Accessed December 2021. http://naturemappingfoundation.org/.

O'Shea, T. J., P. M. Cryan, D. T. S. Hayman, R. K. Plowright, and D. G. Streicker. 2016. Multiple Mortality Events in Bats: A Global Review. Mammal Review 46(3):175–190.

Oxley, D. J., M. B. Fenton, and G. R. Carmondy. 1974. The Effects of Roads on Populations of Small Animals. Journal of Applied Ecology 11:51–59.

Paterson, J. E., J. Baxter-Gilbert, F. Beaudry, S. Carstairs, P. Chow-Fraser, C. B. Edge, A. M. Lentini, J. D. Litzgus, C. E. Markle, K. McKeown, J. A. Moore, J. M. Refsnider, J. L. Riley, J. D. Rouse, D. C. Seburn, J. R. Zimmerling, and C. M. Davy. 2019. Road Avoidance and Its Energetic Consequences for Reptiles. Ecology and Evolution 9(17):9794–9803. Accessed June 9, 2022. https://doi.org/10.1002/ece3.5515.

Pearse, A. T., D. A. Brandt, and G. L. Krapu. 2016. Wintering Sandhill Crane Exposure to Wind Energy Development in the Central and Southern Great Plains, USA. The Condor 118:391–401.

Poulin, R. G., L. D. Todd, E. A. Haug, B. A. Millsap, and M. S. Martell. 2020. Burrowing Owl (*Athene cunicularia*), version 1.0. In Birds of the World (A. F. Poole, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. Accessed June 9, 2022. https://doi.org/10.2173/bow.burowl.01.

Pruett, C. L., M. Patten, and D. H. Wolfe. 2009. It's Not Easy Being Green: Wind Energy and a Declining Grassland Bird. BioScience 59(3):257–262.

Rabin, L. A. and R. G. Cross. 2006. The Effects of Wind Turbines on Antipredator Behavior in California Ground Squirrels (*Spermophilus beecheyi*). Biological Conversation 131(3):410–420.

Rees, E. R. 2012. Impacts of Wind Farms on Swans and Geese: A Review. Wildfowl 62:37–72.

Reynolds, T. D., T. D. Rich, and D. A. Stephens. 2020. Sage Thrasher (*Oreoscoptes montanus*), version 1.0. In Birds of the World (A. F. Poole and F. B. Gill, Editors). Cornell Lab of Ornithology, Ithaca, NY, USA. Accessed June 9, 2022. https://doi.org/10.2173/bow.sagthr.01.

Richardson, M. L., B. A. Wilson, D. A. S. Aiuto, J. E. Crosby, A. Alonso, F. Dallmeier, and G. K Golinski. 2017. A Review of the Impact of Pipelines and Power Lines on Biodiversity and Strategies for Mitigation. Biodiversity and Conservation 26(8):1801–1815. doi:10.1007/s10531-017-1341-9.

Richardson, S. M., P. R. Lintott, D. J. Hosken, T. Economou, and F. Mathews. 2021. Peak in Bat Activity at Turbines and the Implications for Mitigating the Impact of Wind Energy Developments on Bats. Scientific Reports 11:3636.

Robel, R. J. 2002. Expected Impacts on Greater Prairie-Chickens of Establishing a Wind Turbine Facility near Rosalia, Kansas. Report to Zilkha Renewable Energy, Houston, Texas, USA.

Roman, P. R., C. O. Salinas, and B. M. Araujo. 2020. Assessing the Effect of Wind Farms in Fauna with a Mathematical Model. Nature Portfolio 10:14785. Accessed June 9, 2022. https://doi.org/10.1038/s41598-020-71758-5.

Row, J. R., G. Blouin-Demers, and P. J. Weatherhead. 2007 Demographic Effects of Road Mortality in Black Ratsnakes (*Elaphe obsoleta*). Biological Conservation:137(1):117–124.

Russo, D., L. Cistrone, and G. Jones. 2012. Sensory Ecology of Water Detection by Bats: A Field Experiment. PLoS ONE. 7(10):e48144.

Scholl, E. M. and U. Nopp-Mayr. 2021. Impact of Wind Power Plants on Mammalian and Avian Wildlife Species in Shrub- and Woodlands. Biological Conservation 256.

Schwitters, L., D. Schwitters, E. L. Bull, and C. T. Collins. 2021. Vaux's Swift (*Chaetura vauxi*), version 1.1. In Birds of the World (P. G. Rodewald, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. Accessed June 9, 2022. https://doi.org/10.2173/bow.vauswi.01.1.

Shaffer, J. A. and D. A. Buhl. 2016. Effects of Wind-energy Facilities on Grassland Bird Distributions. Conservation Biology 30(1):59–71.

Shannon, G., M. F. McKenna, L. M. Angeloni, K. R. Crooks, K. M. Fristrup, E. Brown, K. A. Warner, M. D. Nelson, C. White, J. Bridggs, S. McFarland, and G. Wittemyer. 2016. A Synthesis of Two Decades of Research Documenting the Effects of Noise on Wildlife. Biological Reviews: 91(4):982–1005.

Shepard, D. B., A. R. Kuhns, M. J. Dreslik, and C. A. Phillips. 2008. Roads as Barriers to Animal Movement in Fragmented Landscapes. Animal Conservation 11(4):288–296.

Smallwood, K. W. and N.L. Smallwood. 2021. Breeding Density and Collision Mortality of Loggerhead Shrike (*Lanius ludovicianus*) in the Altamont Pass Wind Resource Area. Diversity 2021, 13, 540. Accessed June 9, 2022. https://doi.org/10.3390/d13110540.

Smith, K. T., K. L. Taylor, S. E. Albeke, and J. L. Beck. 2020. Pronghorn Winter Resource Selection before and after Wind Energy Development in South-central Wyoming. Rangeland Ecology and Management 73:227–233.

Steenhof, K. 2020. Prairie Falcon (*Falco mexicanus*), version 1.0. In Birds of the World (A. F. Poole, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.prafal.01.

St-Laurent, M. H., C. Dussault, J. Ferron, and R. Gagnon. 2009. Dissecting Habitat Loss and Fragmentation Effects Following Logging in Boreal Forest: Conservation Perspectives from Landscape Simulations. Biological Conservation 142:2240–2249.

Tetra Tech. 2021. Washington Department of Fish and Wildlife Data Request Regarding Potential Impacts to Pronghorn from Wind and Solar Energy Development at the Horse Heave Clean Energy Center, Benton County, Washington. Prepared for Scout Clean Energy.

USFWS (U.S. Fish and Wildlife Service). 2012. Land-Based Wind Energy Guidelines. Accessed June 9, 2022. https://www.fws.gov/sites/default/files/documents/land-based-wind-energy-guidelines.pdf.

USFWS (U.S. Fish and Wildlife Service). 2013. Eagle Conservation Plan Guidance Module 1 - Land-based Wind Energy Version 2. Accessed June 9, 2022. https://www.fws.gov/guidance/guidance/sites/guidance/files/documents/eagleconservationplanguidance.pdf

USFWS (U.S. Fish and Wildlife Service). 2016. Eagle Permits; Revisions to Regulations for Eagle Incidental Take and Take of Eagle Nests. Accessed June 9, 2022. https://www.federalregister.gov/documents/2016/12/16/2016-29908/eagle-permits-revisions-to-regulations-for-eagle-incidental-take-and-take-of-eagle-nests.

USFWS (U.S. Fish and Wildlife Service). 2020. Wildlife Buffer Recommendations for Wind Energy Projects, Region 6.

Usgaard, R. E., D. E. Naugle, R. G. Osborn, and K. F. Higgins.1997. Effects of Wind Turbines on Nesting Raptors at Buffalo Ridge in Southwestern Minnesota. Proceedings of the South Dakota Academy of Sciences 76: 113–117.

Vennesland, R. G. 2004. Great Blue Heron *Ardea herodias*. In Account and Measures for Managing Identified Wildlife – Accounts V. 2004. Accessed June 9, 2020. https://www.env.gov.bc.ca/wld/frpa/iwms/documents/Birds/b_greatblueheron.pdf.

Vennesland, R. G. and R. W. Butler. 2020. Great Blue Heron (*Ardea herodias*), version 1.0. In Birds of the World (A. F. Poole, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.grbher3.01.

Watson, J. W., A. A. Duff, and R. W. Davis. 2014. Home Range and Resource Selection by GPS-Monitored Adult Golden Eagles in the Columbia Plateau Ecoregion: Implications for Wind Power Development. The Journal of Wildlife Management 78(6):1012–1021.

Watson, J. W., I. N. Keren, R. W. Davis. 2018. Behavioral Accommodation of Nesting Hawks to Wind Turbines. The Journal of Wildlife Management 82(8):1784–1794.

WDFW (Washington Department of Fish and Wildlife). 1996. Status of Washington's Shrub-Steppe Ecosystem: Extent, Ownership, and Wildlife/Vegetation Relationships. https://wdfw.wa.gov/publications/01088.

WDFW (Washington Department of Fish and Wildlife). 2009. Wind Power Guidelines. Olympia, WA. https://wdfw.wa.gov/sites/default/files/publications/00294/wdfw00294.pdf.

WDFW (Washington Department of Fish and Wildlife). 2022a. PHS on the Web. Accessed January 25, 2022. https://geodataservices.wdfw.wa.gov/hp/phs/

WDFW (Washington Department of Fish and Wildlife). 2022b. Species in Washington. Accessed January 20, 2022. https://wdfw.wa.gov/species-habitats/species.

Weaver, J. L, P. C., Paquet, and L. F. Ruggiero. 1996. Resilience and Conservation of Large Carnivores in the Rocky Mountains. Conservation Biology 10(4):964–976.

WEST (Western EcoSystems Technology Inc.). 2019. Regional Summaries of Wildlife Fatalities at Wind Facilities in the United States. 2019 Report from the Renew Database. Published by WEST, Inc., Cheyenne, Wyoming. https://west-inc.com/news-insights/publications/.

WHCWG (Washington Wildlife Habitat Connectivity Working Group). 2012. Washington Connected Landscapes Project: Analysis of the Columbia Plateau Ecoregion. Washington's Department of Fish and Wildlife, and Department of Transportation, Olympia, Washington.

WHCWG (Washington Wildlife Habitat Connectivity Working Group). 2013. Columbia Plateau Ecoregion Connectivity Analysis Addendum: Habitat Connectivity Centrality, Pinch-points, and Barriers/Restoration Analyses. Washington's Department of Fish and Wildlife, and Department of Transportation, Olympia, Washington.

Yosef, R. 2020. Loggerhead Shrike (*Lanius ludovicianus*), version 1.0. In Birds of the World (A. F. Poole and F. B. Gill, Editors). Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.logshr.01.

Zimmerling, J. R. and C. M. Francis. 2016. Bat Mortality Due to Wind Turbines in Canada. Wildlife Management 80(8):1360–1369.

Section 4.7 – Energy and Natural Resources

AISI (American Iron and Steel Institute). 2021. AISI Releases Annual Statistical Report For 2020. Accessed November 16, 2021. https://www.steel.org/2021/06/aisi-releases-annual-statistical-report-2020/.

City of Kennewick. 2017. Water Comprehensive Plan. Accessed November 17, 2021. https://www.go2kennewick.com/DocumentCenter/View/9775/2017-Water-Comp-Plan?bidId=.

DOE (U.S. Department of Energy). Not dated. Alternative Fuels Data Center: Washington Transportation Data for Alternative Fuels and Vehicles Accessed November 16, 2021. https://afdc.energy.gov/states/wa?menu=mi.

Horse Heaven Wind Farm, LLC. 2021. Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification. EFSEC Docket Number: EF-210011. February 2021.

Portland Cement Association. 2016. Washington Cement Industry. Accessed November 16, 2021. https://www.cement.org/docs/default-source/ga-pdfs/cement-industry-by-state-2015/washington.pdf?sfvrsn=2&sfvrsn=2.

Portland Cement Association. 2019. How Concrete is Made. Accessed November 16, 2021. https://www.cement.org/cement-concrete/how-concrete-is-made.

WAC (Washington Administrative Code). Chapter 463-60, Section 463-60-342. Natural environment—Energy and natural resources. Accessed December 2, 2022. https://app.leg.wa.gov/wac/default.aspx?cite=463-60-342.

USDOT (U.S. Department of Transportation). 2015. Gravel Roads Construction and Maintenance Guide, August 2015. Accessed April 12, 2022. https://www.fhwa.dot.gov/construction/pubs/ots15002.pdf.

Section 4.8 – Land and Shoreline Use

Benton County. 2021. 2017 Benton County Comprehensive Plan. Updated June 2021, Adopted February 13, 2018. Accessed November 3, 2021. https://www.co.benton.wa.us/pview.aspx?id=1425&catid=0.

Horse Heaven Wind Farm, LLC. 2021. Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification. EFSEC Docket Number: EF-210011. February 2021.

Tetra Tech. 2021. 2021 Botany and Habitat Survey Report for Horse Heaven Wind Farm. Prepared for Horse Heaven Wind Farm, LLC by Tetra Tech. August 2021.

USDA (United States Department of Agriculture) 2020. 2020 Washington Annual Statistical Bulletin. Accessed March 30, 2022. https://www.nass.usda.gov/Statistics_by_State/Washington/Publications/Annual_Statistical_Bulletin/2020/WA_ANN_2020.pdf.

USDA (United States Department of Agriculture) 2022. Wheat Sector at a Glance. Accessed April 11, 2022. https://www.ers.usda.gov/topics/crops/wheat/wheat-sector-at-a-glance/.

WDFW (Washington Department of Fish and Wildlife). 2009. Wind Power Guidelines. Olympia, Washington. https://wdfw.wa.gov/sites/default/files/publications/00294/wdfw00294.pdf.

Section 4.9 – Historic and Cultural Resources

Advisory Council on Historic Properties. 2019. Memorandum to ACHP Staff from ACHP Office of General Counsel. Recent court decision regarding the meaning of “direct” in Sections 106 and 110(f) of the National Historic Preservation Act. June 7, 2019. Accessed June 30, 2022. https://dahp.wa.gov/sites/default/files/OGC_memo_to_ACHP_staff_re_meaning_of_direct_6-7-19.pdf.

Barney, Casey. 2021. Personal communication (letter) from C. Barney, Interim Program Manager, Yakama Nation Cultural Resources Program, to Sonia Bumpus, Washington Energy Facility Site Evaluation Council. March 2, 2021.

CTUIR (Confederated Tribes of the Umatilla Indian Reservation). 2021a. Personal communication (letter) to the Washington Energy Facility Site Evaluation Council. April 9, 2021.

CTUIR (Confederated Tribes of the Umatilla Indian Reservation). 2021b. Traditional Use Study of the Horse Heaven Wind Farm Project, Benton County, Washington. Executive Summary.

Davis, S. J., J. Tuck, K. Burk-Hise, J. Hopt, and E. K. Ragsdale. 2021. Cultural Resource Investigations on Privately Owned Land for the Horse Heaven Wind Farm Project, Benton County, Washington—Addendum One. Prepared by Historical Research Associates, Inc., Portland, Oregon. Unpublished confidential document.

Hanson, S. 2021. Personal communication (letter) from S. Hanson, Transportation Archaeologist, State of Washington Department of Archaeology and Historic Preservation, to Amy Moon, Energy Facility Site Specialist, Washington Energy Facility Siting Evaluation Council. December 10, 2021.

Horse Heaven Wind Farm, LLC. 2021. Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification EFSEC Docket Number: EF-210011. February.

RCW (Revised Code of Washington). Chapter 27.53. Archaeological Sites and Resources. Accessed December 2, 2022. https://app.leg.wa.gov/rcw/default.aspx?cite=27.53.

RCW (Revised Code of Washington). Chapter 27.34, Section 27.34.220. Director—Powers. Accessed December 2, 2022. https://app.leg.wa.gov/rcw/default.aspx?cite=27.34.220.

RCW (Revised Code of Washington). Chapter 27.53, Section 27.53.060. Disturbing archaeological resource or site—Permit required—Conditions—Exceptions—Penalty. Accessed December 2, 2022. https://apps.leg.wa.gov/rcw/default.aspx?cite=27.53.060.

WAC (Washington Administrative Code). Chapter 25-48, Section 25-48-020. Definitions. Accessed December 2, 2022. https://apps.leg.wa.gov/wac/default.aspx?cite=25-48-020.

WAC (Washington Administrative Code). Chapter 197-11, Section 197-11-080. Incomplete or unavailable information. Accessed December 2, 2022. https://app.leg.wa.gov/wac/default.aspx?cite=197-11-080#:~:text=(1)%20If%20information%20on%20significant,information%20in%20their%20environmental%20documents.

WAC (Washington Administrative Code). Chapter 27.44, Indian Graves and Records. Accessed December 2, 2022. https://app.leg.wa.gov/rcw/default.aspx?cite=27.44.

Yakama Nation (Confederated Tribes and Bands of the Yakama Nation). 2021. Personal communication (letter) to the Washington Energy Facility Site Evaluation Council. March 2, 2021.

Section 4.10 – Visual Aspects, Light and Glare

Benton County. 2022. 2017 Comprehensive Plan, Updated April 2022. Adopted February 13, 2018. Amendments adopted by resolution January 14, 2020. Accessed September 15, 2022. https://www.co.benton.wa.us/files/documents/BentonCountyCompPlandApril122022129025740070522PM.pdf .

BLM (Bureau of Land Management). 1986. Visual Resource Contrast Rating. BLM Manual 8431. Accessed February 8, 2022. https://blmwyomingvisual.anl.gov/docs/BLM_VCR_8431.pdf.

BLM (Bureau of Land Management). 2013. Best Management Practices for Reducing Visual Impacts of Renewable Energy Facilities on BLM-Administered Lands. BLM Wyoming State Office, Cheyenne. Accessed February 8, 2022. https://blmwyomingvisual.anl.gov/docs/BLM_RenewableEnergyVisualBMPs_LowRes.pdf.

CESA (Clean Energy States Alliance). 2011. A Visual Impact Assessment Process for Wind Energy Projects. Accessed February 8, 2022. https://www.cesa.org/assets/2011-Files/States-Advancing-Wind-2/CESA-Visual-Impacts-Methodology-May2011.pdf.

CIE (Commission internationale de l'éclairage). 1997. Technical Report: Guidelines for Minimizing Sky Glow. Vienna, Austria: Commission internationale de l'éclairage Report No.: CIE 126: 1997, ISBN 978 3 900734 83 1.

DOE (U.S. Department of Energy). 2017. An Investigation of LED Street Lighting's Impact on Sky Glow. Accessed July 2021. https://www.energy.gov/sites/prod/files/2017/05/f34/2017_led-impact-sky-glow.pdf.

EMD (EMD International). 2019. EMD International A/S. 2019 WindPRO, Version 3.3.274 Aalborg, Denmark.

Epilepsy Action. 2018. Information Web Page on Photosensitive Epilepsy. British Epilepsy Association. Accessed December 2020. https://www.epilepsy.org.uk/info/photosensitive-epilepsy.

FAA (Federal Aviation Administration). 2020. 70/7460-1M – Obstruction Marking and Lighting. Accessed April 20, 2022. https://www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/document.current/documentnumber/70_7460-1.

ForgeSolar. 2020. Sandia Solar Glare Hazard Analysis Tool, GlareGauge hosted by ForgeSolar. Accessed October 12, 2021. https://www.forgesolar.com/.

Horse Heaven Wind Farm, LLC. 2021a. Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification. EFSEC Docket Number: EF-210011. February 2021.

Horse Heaven Wind Farm, LLC. 2021b. Aesthetics Technical Memorandum for the Horse Heaven Wind Farm Project. Prepared for Horse Heaven Wind Farm, LLC. On file at SWCA Environmental Consultants, Salt Lake City, Utah. October.

Horse Heaven Wind Farm, LLC. 2021c. Shadow Flicker Analysis Memorandum for the Horse Heaven Wind Farm Project. January 2021. Appendix G of Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification. EFSEC Docket Number: EF-210011.

Horse Heaven Wind Farm, LLC. 2021d. Glare Analysis Report for the Horse Heaven Wind Farm. January 2021. Appendix H of Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification. EFSEC Docket Number: EF-210011.

Kobus, Dave. 2022. Personal communication (email) between Dave Kobus, Senior Project Manager, Scout Clean Energy, and Amy Moon, Energy Facility Site Specialist, Washington Energy Facility Site Evaluation Council. January 24, 2022.

Lampeter, Richard. 2011. Shadow Flicker Regulations and Guidance: New England and Beyond. Shadow Flicker Regulations and Guidance: New England and Beyond, February 10, 2011.

NOAA (National Oceanic and Atmospheric Administration). 2019. Comparative Climatic Data for the United States through 2018.

Sandia (Sandia National Laboratories). 2016. Solar Glare Hazard Analysis Tool (SGHAT) User's Manual v. 3.0. December 6, 2016.

SWCA (SWCA Environmental Consultants). 2022. Horse Heaven Wind Farm Project Visual Impact Assessment Report. April 2022.

USGS (U.S. Geological Survey). 2017. 1/3rd arc-second Digital Elevation Models (DEMs) – USGS National Map 3DEP Downloadable Data Collection: U.S. Geological Survey.

Section 4.11 – Noise and Vibration

Bolt Beranek and Newman, Inc. 1977. Power Plant Construction Noise Guide. Prepared for the Empire State Electric Energy Research Corporation, Report No. 3321.

DataKustik GmbH. 2020. Computer Aided Noise Abatement Model CadnaA, Version MR 1 Munich, Germany.

EPA (U.S. Environmental Protection Agency). 1974. Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety. Office of Noise Abatement and Control. Washington, DC.

FHWA (Federal Highway Administration). 2006. FHWA Roadway Construction Noise Model User's Guide, FHWA-HEP-05-054, January.

FTA (Federal Transit Administration). 2018. Transit Noise and Vibration Impact Assessment Manual, September 2018. Accessed January 28, 2022. https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf.

Horse Heaven Wind Farm, LLC. 2021a. Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification. EFSEC Docket Number: EF-210011. February 2021.

Horse Heaven Wind Farm, LLC. 2021b. Response to Data Request No. 3; Noise-5, Noise-6 and Noise-7. Submitted to the Washington Energy Facility Site Evaluation Council in support of Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification. EFSEC Docket Number: EF-210011.

Horse Heaven Wind Farm, LLC. 2021c. Response to Data Request No. 5; Noise-9. Submitted to the Washington Energy Facility Site Evaluation Council in support of Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification. EFSEC Docket Number: EF-210011.

Horse Heaven Wind Farm, LLC. 2021d. Technical Memorandum. Horse Heaven Wind Farm – Acoustic Model Sound Source Input Data. November 2021.

Horse Heaven Wind Farm, LLC. 2022. Supplemental response to Data Request No. 5; Noise-9. Submitted to the Washington Energy Facility Site Evaluation Council in support of Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification. EFSEC Docket Number: EF-210011.

NEMA (National Electrical Manufacturers Association). 2019. NEMA Standards Publication TR-2013. 2019. Transformers, Step Voltage Regulators and Reactors. Rosslyn, Virginia.

Tetra Tech. 2021. Baseline Sound Survey Report, Benton County, Washington. Prepared by Tetra Tech for Horse Heaven Wind Farm, LLC. February 2021.

WAC (Washington Administrative Code). Chapter 197-11, Section 197-11-794. Significant. Accessed December 02, 2022. https://app.leg.wa.gov/wac/default.aspx?cite=197-11-794.

WAC (Washington Administrative Code). Chapter 197-11, Section 197-11-330. Threshold determination process. Accessed December 02, 2022. https://apps.leg.wa.gov/wac/default.aspx?cite=197-11-330.

WAC (Washington Administrative Code). Chapter 173-60. Maximum Environmental Noise Levels. Accessed December 2, 2022. https://app.leg.wa.gov/wac/default.aspx?cite=173-60.

WAC (Washington Administrative Code). Chapter 173-60, Section 173-60-040. Maximum permissible environmental noise levels. Accessed December 2, 2022. https://app.leg.wa.gov/wac/default.aspx?cite=173-60-040.

Section 4.12 – Recreation

DNR (Washington Department of Natural Resources, Division of Geology and Earth Resources). 2016. Ice Age Floods National Geologic Trail, Washington Section – Earth Science Week. 2016. Accessed December 1, 2021. https://www.dnr.wa.gov/publications/ger_presentations_esw_2016_coe.pdf.

Horse Heaven Wind Farm, LLC. 2021a. Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification. EFSEC Docket Number: EF-210011. February 2021.

Horse Heaven Wind Farm, LLC. 2021b. Response to Data Request No. 2; Land and Shoreline Use-1. Submitted to the Washington Energy Facility Site Evaluation Council in support of Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification. EFSEC Docket Number: EF-210011.

Horse Heaven Wind Farm, LLC. 2021c. Response to Data Request No. 3; Attachment Recreation-1. submitted to the Washington Energy Facility Site Evaluation Council in support of Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification. EFSEC Docket Number: EF-210011.

Paragliding Forum. Not dated. Leonardo: The Global Flight Database. Takeoffs from Kiona. Accessed September 27, 2022. https://www.paraglidingforum.com/leonardo/page/filter.

RCW (Revised Code of Washington). Chapter 77.04, Section 77.04.012. Mandate of department and commission. Accessed December 2, 2022. https://app.leg.wa.gov/rcw/default.aspx?cite=77.04.012.

RCW (Revised Code of Washington). Chapter 77.04, Section 77.04.020. Composition of department—Powers and duties. Accessed December 2, 2022. https://app.leg.wa.gov/rcw/default.aspx?cite=77.04.020.

RCW (Revised Code of Washington). Chapter 90.58, Section 90.58.080. Timetable for local governments to develop or amend master programs—Review of master programs—Grants. https://app.leg.wa.gov/rcw/default.aspx?cite=90.58.080.

RCW (Revised Code of Washington). Chapter 77.04, Section 77.04.055. Commission—Duties. Accessed December 2, 2022. https://app.leg.wa.gov/rcw/default.aspx?cite=77.04.055.

RCW (Revised Code of Washington). Chapter 36.70A. Growth Management—Planning by Selected Counties and Cities. Accessed December 2, 2022. https://apps.leg.wa.gov/rcw/default.aspx?cite=36.70a.

RCW (Revised Code of Washington). Chapter 36.70a, Section 36.70A.020. Planning goals. Accessed December 2, 2022. https://app.leg.wa.gov/rcw/default.aspx?cite=36.70a.020.

RCW (Revised Code of Washington). Chapter 36.70A, Section 36.70A.010. Legislative findings. Accessed December 2, 2022. https://app.leg.wa.gov/rcw/default.aspx?cite=36.70A.010.

SWCA (SWCA Environmental Consultants). 2022. Horse Heaven Wind Farm Project Final Visual Impact Assessment Report. April 2022.

WAC (Washington Administrative Code). Chapter 197-11, Section 197-11-794. Significant. Accessed December 2, 2022. https://app.leg.wa.gov/wac/default.aspx?cite=197-11-794.

WAC (Washington Administrative Code). Chapter 197-11, Section 197-11-330. Threshold determination process. Accessed December 2, 2022. https://apps.leg.wa.gov/wac/default.aspx?cite=197-11-330.

WAC (Washington Administrative Code). Chapter 173-60, Section 173-60-030. Identification of environments. Accessed December 2, 2022. https://app.leg.wa.gov/wac/default.aspx?cite=173-60-030.

Section 4.13 – Public Health and Safety

Carbon Brief. 2014. Factcheck: How Often Do Wind Turbines Catch Fire? And Does It Matter? July 17, 2014. Accessed December 27, 2021. https://www.carbonbrief.org/factcheck-how-often-do-wind-turbines-catch-fire-and-does-it-matter.

Carter, Mike. 2019. Juniper Fire in Klickitat County 80% Contained, Response to Downgrade Tuesday. Seattle Times. July 21, 2019.

Hoen, B. D., J. E. Diffendorfer, J. T. Rand, L. A. Kramer, C. P. Garrity, and H. E. Hunt. 2018. United States Wind Turbine Database (v4.2, November 1, 2021): U.S. Geological Survey, American Clean Power Association, and Lawrence Berkeley National Laboratory data release, https://doi.org/10.5066/F7TX3DN0. Accessed December 27, 2021. https://eerscmap.usgs.gov/uswtdb/.

Horse Heaven Wind Farm, LLC. 2021. Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Council Application for Site Certification. EFSEC Docket Number: EF-210011. February 2021.

WAC (Washington Administrative Code). Chapter 463-60, Section 463-60-352. Built environment—Environmental health. Accessed December 2, 2022. https://app.leg.wa.gov/wac/default.aspx?cite=463-60-352.

WAC (Washington Administrative Code). Chapter 197-11, Section 197-11-960. Environmental checklist. Accessed December 2, 2022. https://app.leg.wa.gov/wac/default.aspx?cite=197-11-960.

WAC (Washington Administrative Code). Chapter 197-11, Section 197-11-794. Significant. Accessed December 2, 2022. https://app.leg.wa.gov/wac/default.aspx?cite=197-11-794.

WAC (Washington Administrative Code). Chapter 197-11, Section 197-11-330. Threshold determination process. Accessed December 2, 2022. https://apps.leg.wa.gov/wac/default.aspx?cite=197-11-330.

WAC (Washington Administrative Code). Chapter 296-155, Safety Standards for Construction Work. Accessed December 2, 2022. https://app.leg.wa.gov/wac/default.aspx?cite=296-155.

Section 4.14 – Transportation

Benton County. 2021. Benton County Comprehensive Plan. Updated June 2021, Adopted on February 13, 2018. Amendments adopted by resolution January 14, 2020. Appendix H – Transportation. Accessed December 28, 2021. https://www.co.benton.wa.us/pview.aspx?id=1425&catid=0.

Benton County. 2022. Benton County Standard Plans. Accessed May 4, 2022. https://www.co.benton.wa.us/pview.aspx?id=10160&catid=0.

EPA (U.S. Environmental Protection Agency). 2013. Renewable energy Fact Sheet: Wind Turbines. Accessed May 5, 2022. https://www.epa.gov/sites/default/files/2019-08/documents/wind_turbines_fact_sheet_p100il8k.pdf.

Horse Heaven Wind Farm, LLC. 2021. Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification. EFSEC Docket Number: EF-210011. February 2021.

TRB (Transportation Research Board). 2016. Highway Capacity Manual, Sixth Edition: A Guide for Multimodal Mobility Analysis. Transportation Research Board: Washington, D.C.

USDOT (U.S. Department of Transportation). Not dated. FRA – Safety Map. Accessed January 20, 2022. https://fragis.fra.dot.gov/GISFRASafety/.

USDOT (U.S. Department of Transportation). 2020. Freight Management and Operations. Accessed January 20, 2022. https://ops.fhwa.dot.gov/publications/fhwahop16051/ch5.htm.

USDOT FHWA (U.S. Department of Transportation Federal Highway Administration). 2021. FHWA Work Zone Facts and Statistics. Accessed January 4, 2022. https://ops.fhwa.dot.gov/wz/resources/facts_stats.htm.

WAC (Washington Administrative Code). Chapter 197-11, Section 197-11-794. Significant. Accessed December 2, 2022. https://app.leg.wa.gov/wac/default.aspx?cite=197-11-794.

WAC (Washington Administrative Code). Chapter 197-11, Section 197-11-330. Threshold determination process. Accessed December 2, 2022. https://apps.leg.wa.gov/wac/default.aspx?cite=197-11-330.

WSDOT (Washington State Department of Transportation). 2016. 2016 Annual Traffic Report. Accessed January 4, 2022. https://digitalarchives.wa.gov/do/6F5FB22E627538839E4DBAC41BDDF87C.pdf.

WSDOT (Washington State Department of Transportation). 2019. Traffic GeoPortal. Accessed January 4, 2022. https://www.wsdot.wa.gov/data/tools/geoportal/?config=traffic.

Section 4.15 – Public Services and Utilities

Benton County. 2014. 2013 Update Benton County Solid Waste and Moderate Risk Waste Plan – Final Draft. Accessed January 3, 2022. https://www.co.benton.wa.us/files/documents/document133022317111714.pdf.

Benton County. 2021. 2017 Benton County Comprehensive Plan, Updated June 2021, Adopted February 13, 2018. Amendments adopted by resolution January 14, 2020. Accessed November 3, 2021. https://co.benton.wa.us/pview.aspx?id=1425&catID=0&msclkid=16257c49af7a11ecba7ce7f595ff9205.

Clark County, Washington. 2015. Clark County Solid Waste Management Plan 2015. Accessed January 3, 2022. https://clark.wa.gov/public-health/solid-waste-management-plan.

Horse Heaven Wind Farm, LLC. 2021. Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification. EFSEC Docket Number: EF-210011. February 2021.

WAC (Washington Administrative Code). Chapter 463-60, Section 463-60-535. Socioeconomic impact. Accessed December 2, 2022. https://app.leg.wa.gov/wac/default.aspx?cite=463-60-535.

WAC (Washington Administrative Code). Chapter 197-11, Section 197-11-794. Significant. Accessed December 2, 2022. https://app.leg.wa.gov/wac/default.aspx?cite=197-11-794.

Washington State Department of Health. 2002. Rule Development Committee Issues Research Report – Residential Flow Rates. Accessed January 11, 2022. https://www.doh.wa.gov/portals/1/Documents/Pubs/337-103.pdf.

Waste Management. 2019. Columbia Ridge Landfill and Green Energy Plant. Accessed January 3, 2022. https://www.wmnorthwest.com/landfill/pdf/columbiaridge.pdf.

WSDOT (Washington State Department of Transportation). 2022. 2022 Standard Specifications M 41-10. Division 9 Materials. Accessed May 29, 2022. https://wsdot.wa.gov/publications/manuals/fulltext/M41-10/Division9.pdf.

Section 4.16 – Socioeconomics

Business Development Bank of Canada. Not dated. Economic Environment. Accessed March 16, 2022. https://www.bdc.ca/en/articles-tools/entrepreneur-toolkit/templates-business-guides/glossary/economic-environment.

CEQ (Council on Environmental Quality). 1997. Environmental Justice Guidance Under the National Environmental Policy Act. Accessed February 22, 2022. https://www.energy.gov/sites/default/files/nepapub/nepa_documents/RedDont/G-CEQ-EJGuidance.pdf.

EPA (U.S. Environmental Protection Agency). 2016. Technical Guidance for Assessing Environmental Justice in Regulatory Analysis. Accessed March 2, 2022. https://www.epa.gov/sites/default/files/2016-06/documents/ejtg_5_6_16_v5.1.pdf.

Florida State University. 2000. Analysing the Economic Impact of Transportation Projects Using RIMS II, IMPLAN, and REM I. Accessed February 22, 2022. https://cefa.fsu.edu/sites/g/files/imported/storage/original/application/18d780904fc532b3cf0bcdcc8a082bfa.pdf.

Horse Heaven Wind Farm, LLC. 2021. Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification. EFSEC Docket Number: EF-210011. February 2021.

RCW (Revised Code of Washington). Chapter 70A02, Environmental Justice. Accessed September 20, 2022. https://app.leg.wa.gov/RCW/default.aspx?cite=70A.02.

RCW (Revised Code of Washington). Chapter 19.405, Section 19.405.020. Definitions. Accessed December 2, 2022. https://app.leg.wa.gov/RCW/default.aspx?cite=19.405.020.

RCW (Revised Code of Washington). Chapter 82.08, Section 82.08.020. Tax imposed—Retail sales—Retail car rental. Accessed December 2, 2022. https://app.leg.wa.gov/rcw/default.aspx?cite=82.08.020.

RCW (Revised Code of Washington). Chapter 82.12, Section 82.12.962. Exemptions—Use of machinery and equipment in generating electricity. Accessed December 2, 2022. https://apps.leg.wa.gov/rcw/default.aspx?cite=82.12.962.

RCW (Revised Code of Washington). Chapter 84.34. Open Space, Agricultural, Timberlands—Current Use—Conservation Futures. Accessed December 2, 2022. https://app.leg.wa.gov/rcw/default.aspx?cite=84.34.

U.S. Congress. Not dated. Visit the Capital. Accessed March 13, 2022. https://www.visitthecapitol.gov/exhibitions/april-2012-september-2012/general-welfare.

USDA (United States Department of Agriculture). 2003. Measuring the Economic Impact of Cooperatives: Results from Wisconsin. Accessed April 28, 2022. https://www.rd.usda.gov/files/RR196.pdf.

U.S. Census Bureau (United States Census Bureau). 2020. 2019 American Community Survey 5-Year Estimates Subject Tables. Table Created January 24, 2022. https://data.census.gov/cedsci/table?g=0400000US53_0500000US53005,53021,53071,53077_1600000US5305560,5314485,5334575,5335275,5345180,5353545,5356450,5358235,5377665&d=ACS%205-Year%20Estimates%20Subject%20Tables&tid=ACSST5Y2019.S1901.

U.S. Department of Health and Human Services. Not dated. Accessed March 16, 2022. https://health.gov/healthypeople/objectives-and-data/social-determinants-health.

WAC (Washington Administrative Code). Chapter 197-11, Section 197-11-448. Relationship of EIS to other considerations. Accessed December 02, 2022. https://app.leg.wa.gov/wac/default.aspx?cite=197-11-448.

WAC (Washington Administrative Code). Chapter 197-11, Section 197-11-794. Significant. Accessed December 02, 2022. https://app.leg.wa.gov/wac/default.aspx?cite=197-11-794.

6.6 Chapter 5 – Cumulative Impacts

Council on Environmental Quality (CEQ). 1997. Cumulative Effects. Accessed September 7, 2021. https://ceq.doe.gov/publications/cumulative_effects.html.

Council on Environmental Quality (CEQ). 2005. Guidance on the Consideration of Past Actions in Cumulative Effects Analysis. Accessed October 1, 2021. https://www.energy.gov/sites/default/files/nepapub/nepa_documents/RedDont/G-CEQ-PastActsCumulEffects.pdf.

DNR (Washington State Department of Natural Resources). Not dated. *Texosporium sancti-jacobi.* Accessed September 27, 2022. https://www.dnr.wa.gov/publications/amp_nh_tesa.pdf.

EPA (U. S. Environmental Protection Agency) 1999. Consideration Of Cumulative Impacts In EPA Review of NEPA Documents. Accessed March 7, 2022. https://www.epa.gov/sites/default/files/2014-08/documents/cumulative.pdf.

WDFW (Washington Department of Fish and Wildlife). 2022a. Ecosystems in Washington: Shrubsteppe. Accessed September 27, 2022. https://wdfw.wa.gov/species-habitats/ecosystems/shrubsteppe.

WDFW (Washington Department of Fish and Wildlife). 2022b. Species in Washington: Ferruginous hawk. Accessed September 27, 2022. https://wdfw.wa.gov/species-habitats/species/buteo-regalis#resources.

Sources of Cumulative Impact Projects

Benton County. 2021. Active Projects. Accessed August 26, 2021. https://www.co.benton.wa.us/pview.aspx?id=20952&catid=0.

Benton County. 2021. Six-year Transportation Improvement Program. Accessed August 26, 2021. https://www.co.benton.wa.us/pview.aspx?id=10589&catid=0.

Benton County Clean Air Agency. 2021. Air Operating Permits. Accessed August 26, 2021. http://bentoncleanair.org/businesses/air-operating-permits.

Benton County Public Utility District. Wind. Accessed August 26, 2021. https://www.bentonpud.org/Safety-Education/Safety/Wind.

Cascade Renewable Transmission. 2021. Cascade Renewable Transmission. Accessed August 26, 2021. https://www.cascaderenewable.com/.

Ecology (Washington State Department of Ecology). 2018. State Environmental Policy Act Handbook 2018 Updates. Accessed September 7, 2021. https://ecology.wa.gov/DOE/files/4c/4c9fec2b-5e6f-44b5-bf13-b253e72a4ea1.pdf.

Ecology (Washington State Department of Ecology). 2021. SEPA Register. Accessed October 1, 2021. https://apps.ecology.wa.gov/separ/Main/SEPA/Search.aspx?SearchFields=All&County=BENTON&PageSize=10&SortColumn=SEPANumberDescending

EFSEC (Washington Energy Facility Site Evaluation Council). 2005. Wild Horse Wind Power Project. Accessed September 7, 2021. https://www.efsec.wa.gov/energy-facilities/wild-horse-wind-power-project/wild-horse-wind-power-project-sepa.

EFSEC (Washington Energy Facility Site Evaluation Council). 2011. Whistling Ridge Energy Project Final Environmental Impact Statement. Accessed September 7, 2021. https://www.efsec.wa.gov/energy-facilities/whistling-ridge-energy-project/whistling-ridge-energy-project-sepa.

EFSEC (Washington Energy Facility Site Evaluation Council). 2021. Energy Facilities Projects Under EFSEC Jurisdiction. Accessed August 26, 2021. https://www.efsec.wa.gov/energy-facilities.

Franklin Public Utility District. 2021. Power Resources. Accessed August 27, 2021. https://www.franklinpud.com/rates-power-services/power-resources/.

Klickitat Public Utility District. 2021. White Creek Wind Project. Accessed August 26, 2021. http://www.klickitatpud.com/yourPUD/projects/WhiteCreek.aspx.

State of Oregon Energy Facility Siting Council. 2021. Facilities Under EFSC. Accessed August 26, 2021. https://www.oregon.gov/energy/facilities-safety/facilities/Pages/Facilities-Under-EFSC.aspx.

U.S. Army Corps of Engineers. 2021. Walla Walla Regulatory Division. Accessed August 27, 2021. https://www.nww.usace.army.mil/Business-With-Us/Regulatory-Division/.

U.S Department of Energy. 2021. Introducing Cumulative Effects. Accessed August 27, 2021. https://ceq.doe.gov/docs/ceq-publications/ccenepa/sec1.pdf.

Walla Walla County. 2021. Planning Commission. Accessed August 27, 2021. https://www.co.walla-walla.wa.us/government/community_development/planning_commission.php.

WSDOT (Washington State Department of Transportation). 2022. Environmental Manual M 31-11: Chapter 4:12 Indirect Effects and Cumulative Impacts. Accessed October 17, 2022. https://wsdot.wa.gov/engineering-standards/all-manuals-and-standards/manuals/environmental-manual.

WSDOT (Washington State Department of Transportation). 2021. Statewide Transportation Improvement Program (STIP). Accessed August 26, 2021. https://wsdot.wa.gov/LocalPrograms/ProgramMgmt/STIP.htm.

7.0 CHAPTER 7 – LIST OF PREPARERS

This chapter lists the individuals who contributed to the preparation of this Draft Environmental Impact Statement (EIS). It also includes each individual's organization affiliation and a brief description of their professional background.

7.1 Washington State Energy Facility Site Evaluation Council

Betts, Patricia – Washington State Environmental Policy Act (SEPA) Specialist

Role:	Environmental Impact Statement Guidance and Review
Education:	BS, Zoology
Expertise:	30 years of experience in SEPA implementation for three Washington State agencies: Department of Ecology (Ecology), Department of Natural Resources, and the Energy Facility Site Evaluation Council (EFSEC). Ms. Betts' SEPA duties included managing state agency SEPA EISs; participating in the development of, reviewing, and commenting on other SEPA and National Environmental Policy Act (NEPA) EISs; interpreting SEPA rules and advising agencies, the public, and applicants; and preparing SEPA guidance, conducting training, and developing SEPA policy.

Chisholm, Sean – Energy Facility Site Specialist

Role:	Project Specialist
Education:	BS, Environmental Studies with emphasis in Geography BA, History
Expertise:	Over three years of experience working with Washington Department of Ecology in the Toxic Cleanup Program and two land survey field seasons with Bureau of Land Management, Coeur d'Alene, Idaho Office. Mr. Chisholm also has experience with the Washington Department of Fish and Wildlife conducting inspections and collecting data on commercial and sport fisherman's catch, keep and/or release program. In his role with EFSEC, he was the lead Project Manager on the Badger Mountain Solar Energy Project and participated in SEPA reviews and processing site certification permit applications.

Greene, Sean – Environmental Planner

Role:	Environmental Impact Statement Guidance and Review
Education:	MS, Environmental Studies; BA, History; BA, Political Science
Expertise:	Over 9 years of experience in the environmental field, including time spent performing environmental and listed species assessments, technical assistance, environmental planning, permitting, and regulatory compliance. Experience coordinating complex interagency project reviews in a variety of regulatory frameworks, including NEPA and Clean Water Act assessments of large transportation and energy facility projects. Previously employed by the Washington State Department of Transportation where he performed surveys, assessments, and relocations to support construction activities.

Hafkemeyer, Ami – Director of Siting and Compliance

Role:	Contract Manager & Environmental Impact Statement Review
Education:	BS, Ecology and Evolutionary Biology
Expertise:	Over 14 years of experience working in environmental compliance, having worked as an environmental quality program manager for industry prior to joining the EFSEC staff. She has

experience overseeing Clean Water Act and Oil and Petroleum Act compliance programs. In her role with EFSEC, she oversees technical staff in their implementation of SEPA reviews and permit application reviews to process applications for site certification.

Moon, Amy – Energy Facility Site Specialist

Role: Project Manager & Environmental Impact Statement Review

Education: MS, Biology; BS, Environmental Science.

Expertise: Over 17 years as an environmental consultant lead biologist. Duties included environmental surveys, regulatory compliance, permitting, and Program Manager for the wetland and stormwater program. Ms. Moon routinely conducted NEPA analysis and EIS preparation, wetland delineation/permitting/restoration, biological stream surveys, vegetation surveys, sediment and erosion control design and oversight, and Environmental Site Assessments (Phase I & II). Ms. Moon served for six years as the Washington State Department of Ecology's Construction Stormwater General Permit (CSWGP) Writer and as the state lead for the Certified Erosion and Sediment Control Lead (CESCL) program. As an Energy Facility Site Specialist, Ms. Moon is responsible for regulatory compliance for Washington's nuclear power plant, the Columbia Generating Station as well as SEPA environmental reviews and permit application reviews to process site certification applications.

7.2 State Agencies

Office of the Attorney General

Jonathon Thompson, Assistant Attorney General – Technical Reviewer

Washington Department of Fish and Wildlife (WDFW)

Jason Fidorra, Fish & Wildlife Biologist – Technical Reviewer
Michael Ritter, Wind Mitigation Biologist – Technical Reviewer

Washington State Department of Agriculture (WSDA)

Kelly McLain, Policy Advisor to the Director – Technical Reviewer

Washington State Department of Archaeology and Historic Preservation (DAHP)

Allyson Brooks, State Historic Preservation Officer / Director – Technical Reviewer
Dennis Wardlaw, Transportation Archaeologist – Technical Reviewer
Sydney Hanson, Local Government Archaeologist – Technical Reviewer
Lance Wollwage, State Archaeologist – Technical Reviewer

Washington State Department of Ecology (Ecology)

Karl Rains, Regional Planner – Technical Reviewer
Lloyd Stevens Jr., Water Quality Program – Technical Reviewer
Lori White, Shorelands and Environmental Assistance Program – Technical Reviewer
Lynnette Haller, Air Quality Program – Technical Reviewer
Millie Piazza, Program Manager Office of Equity & Environmental Justice – Technical Guidance

Washington State Department of Natural Resources (DNR)

Chad Unland, Natural Resource Specialist – Technical Reviewer
Nate Morse, Natural Resource Scientist – Technical Reviewer

Sara Palmer, State Lands Archaeologist – Technical Reviewer
Walter Fertig, Botanist – Technical Reviewer

Washington State Department of Transportation (WSDOT)
Jacob Prilucik, Development Services – Technical Reviewer
Paul Gonseth, Development Services – Technical Reviewer

Washington Utilities and Transportation Commission (UTC)
Betty Young, Rail Safety Program – Technical Reviewer
Vicki Elliott, Transportation Specialist – Technical Reviewer

7.3 Tribes or Tribal Groups

Tribal staff named below provided technical support to EFSEC for the Draft EIS. The input provided does not constitute government-to-government consultation, nor does it indicate the Tribe's position on the proposal.

Confederated Tribes Of The Yakama Nation
Jessica Lally, Archaeologist – Technical Reviewer
Kyrsten Wolterstorff, Rangeland Biologist – Technical Reviewer
Mark Neutzman, Wildlife Biologist – Technical Reviewer

7.4 WSP Golder

EFSEC was supported by WSP Golder in preparing the Draft EIS. WSP Golder's team included project management, a range of resource specialists, technical writers, and geographic information system (GIS) analysts.

Akkinepally, Vamshi – Transportation Engineer
Role: Transportation Contributing Reviewer
Education: MENG, Civil and Environmental Engineer
Expertise: 20 years' experience in transportation systems analysis, transportation planning, travel demand modeling, traffic engineering, traffic operations, and safety.

Auten, Marc – Senior Permitting Specialist
Role: Senior Technical Review for SEPA Compliance
Public Health and Safety Contributing Author
Education: BS, Environmental Science (Freshwater Ecology)
Expertise: 18 years of experience in environmental regulatory consulting and project development. Expertise in federal, state, and local permitting, including National Environmental Policy Act (NEPA) and Washington State Environmental Policy Act (SEPA).

Cadillo, Jimena – Environmental Consultant
Role: EIS Technical Lead
Education: MS, Environmental Engineering; BS, Industrial Engineering
Expertise: 10 years' experience in management and administration of environmental projects and proposals related to the infrastructure, energy, and mining sectors. Supported US Government Sector activities like business development initiatives, strategic client development and financial planning. Also experienced in Project Controls functions such as cost controls, scheduling, forecasting, and progress and performance analysis.

Cook, Amy – Editor

Role: Technical Editor

Education: Ph.D., English Literature, BA, Linguistics

Expertise: 20-year background in technical and academic writing and editing spans academic book manuscripts, scientific journal articles, and a wide variety of research reports and plans in the environmental sciences. She has experience developing reports associated with environmental permitting for a variety of energy projects, as well as hazardous waste site investigations, remedial action planning documents, and emergency management and response operations for both private-sector and government clients.

Gamble, Don – Environmental Lead Consultant

Role: Water Resources, Vegetation, and Wildlife and Habitat Technical Reviewer

Education: Master of Natural Resource Management; BSc, Physical and Resources Geography

Expertise: 31 years of project management experience, with a specialization in environmental impact assessments (EIAs), regulatory review processes, environmental permit applications, and mitigation and environmental management plans for hydroelectric, oil and gas, mining, transportation, and municipal infrastructure projects.

Harmening, Sierra – Senior Project Scientist

Role: SEPA Compliance and Consistency Reviewer
Recreational Technical Author
Transportation Technical Author

Education: MS, Environmental Law and Policy; BS, Management in Technology

Expertise: Over 15 years of lands permitting, environmental consulting, and mine site management experience. Her experience includes the management and preparation of documents for permit renewals, closure planning, closure cost estimation, National Environmental Policy Act (NEPA) analysis, and compliance monitoring plans.

Hill, Sophie – Engineering Geologist

Role: Earth Resources Contributing Author

Education: Ph.D., Engineering Geology (Rock Mechanics); MESci, Geology

Expertise: Two years' experience with a background in rock mechanics, with an emphasis in experimental rock deformation.

Hindley, Gabrielle – Environmental Scientist

Role: Vegetation and Water Resources Technical Author

Education: MSc Ecological Restoration; BS, Biology

Expertise: Four years of project experience in planning and executing field programs, Terrestrial Ecosystem Mapping, research, ecological restoration, and vegetation monitoring. She also has experience conducting wildlife surveys, environmental monitoring, and designing mitigation.

Hobson, Alice – Cultural Heritage - Environmental and Social Consultant

Role: Historic and Cultural Resources Technical Author

Education: MA, Cultural Heritage Studies; BA, Archaeology and Geography

Expertise: 12 years' experience on a range of urban and rural sites, applying her knowledge of local and national legislation to identify and manage cultural landscapes, historic buildings, archaeological sites and artifacts, intangible heritage, and locally sacred sites. She specializes in survey reconnaissance, including community interviews, to fully capture all elements of the cultural heritage resource.

Hull, Alan – Senior Practice Leader
Role: Earth Resources Technical Reviewer
Education: Ph.D., Geological Sciences; MSc, Geology; BSc, Geology
Expertise: Over 40 years of project experience focusing on earthquake hazard assessment and incorporating seismically active faults into engineering analysis and design.

Jackson, Heather – Senior Project GIS Analyst
Role: GIS Analyst
Education: MA, Geography; BA, Geography
Expertise: 18 years of experience in GIS analysis.

Kosky, Ken – Program Leader
Role: Noise and Vibration Technical Reviewer
Education: MS, Environmental Engineering; BSE, Ocean Engineering
Expertise: Over 50 years of project experience with power plants, industrial facilities, and agricultural activities involving air quality. He provides oversight on permitting and licensing activities, including emissions estimates and impact analyses. Has experience with pollution control quality issues and noise for a variety of electrical power, industrial, and mining activities.

Mason, Andrew – Cultural Heritage Specialist
Role: Historic and Cultural Resources Technical Reviewer
Education: MA, Anthropology; BA, Anthropology
Expertise: Over 30 years of project experience, often within an environmental assessment framework (power, mining, and transportation sectors). He has successfully completed cultural resources overview assessments, inventories, impact assessments, mitigation programs, due diligence reviews, UNESCO World Heritage Site nomination dossier reviews, and policy studies.

Miller, Gage – Senior Environmental Scientist
Role: Noise and Vibration Technical Author
Education: BS, Environmental Science
Expertise: 22 years of noise-related experience, including noise modeling, sound propagation calculations, sound level field measurement, assessments, impact analysis, mitigation analysis, and providing expert testimony. He has experience in performing noise impact assessments in support of permitting activities at the state level and EIAs in support of large domestic and international projects.

Moss, Kate – Terrestrial Biologist
Role: Wildlife and Habitat Technical Author
Education: BSs, Biology
Expertise: 16 years of experience designing, managing, and conducting bio-inventories, biodiversity studies, invasive species studies, wildlife salvages, Species at Risk surveys, impact assessments, and habitat compensation/ mitigation design. She has been involved in

conducting baseline surveys for amphibians, birds, terrestrial gastropods and mammals, annual population monitoring, and relative abundance analysis.

Muschal, Marlis – Archaeologist

Role: Historic and Cultural Resources Technical Author

Education: MS, Social Science/Sociology; BS, History

Expertise: 12 years' experience conducting fieldwork and/or Section 106 of the National Historic Preservation Act compliance across the United States. She has contributed to the National Register of Historic Places (NRHP) evaluation of a variety of precontact and historic archaeological sites. In the field, she has led field crews and is experienced in archaeological survey, excavation, and monitoring. She is also experienced in archaeological site recording using professional-grade GPS units (Trimble GeoExplorer Series), photo documentation, and detailed site sketch maps.

Nazarnia, Naghmeh – Environmental Planner

Role: Socioeconomics Contributing Author

Education: MSc, Geography, Urban, and Environmental Studies; BA, Architecture

Expertise: 8 years of experience in designing and implementing urban and environmental planning and assessment projects. Skilled in social, land use and quality research, data collection, impact analysis and management planning for large and small projects in mining, oil and gas, power, and sustainable energy projects. She has supported the preparation of land use, marine use, visual quality and stakeholder engagement, and indigenous rights and interest chapters of Environmental Assessment Applications.

Paris, Jeremy – Senior Environmental Planner

Role: Project Manager
SEPA Compliance and Consistency Reviewer
Energy and Natural Resources Technical Author
Land and Shoreline Use Technical Author
Public Services and Utilities Technical Author
Socioeconomic Technical Author

Education: MS, Biological Sciences; BS, Biological Sciences

Expertise: 17 years of professional consulting experience leading projects in support of the energy, maritime, transportation, and government sectors. He has prepared high-level NEPA documents, Endangered Species Act Biological Assessments, International Finance Corporation Performance Standards compliant Environment and Social Impact Assessments, California Environmental Quality Act compliant documents, and Master Plans for water quality improvement programs.

Stein, David – Practice Leader, Environmental Planning and Permitting

Role: Air Quality Technical Author

Education: MS, Environmental Engineering; BS, Environmental Engineering; BS, Biological Sciences

Expertise: Over 40 years of environmental management and permitting experience working with major gas and electric utilities, independent power plant developers (both renewable and fossil), major oil and petrochemical conglomerates, refiners, chemical plants, mining facilities, and various other industries. An air quality specialist with experience with air quality districts providing regulatory and rulemaking strategy and advocacy, technical support, permit procurement and compliance support, and expert witness testimony.

Stevens, Kathryn – Project Coordinator

Role: Deputy Project Manager

Education: BA, Communications

Expertise: 20 years of administrative and environmental experience on large-scale projects, reports, quality control, comment responses and tracking, outreach coordination, administrative records, and research.

Warner, Kara – Senior Lead Consultant

Role: SEPA Compliance and Consistency Reviewer
Public Health and Safety Technical Author

Education: Ph.D., Toxicology; MS, Biology

Expertise: 14 years of project experience with EIAs and regulatory compliance. She has supported environmental assessments and EISs under NEPA and SEPA in Washington and Oregon, and managed Oregon Energy Facility Siting Council projects that required analysis of impacts to populations and housing, land use, public health and safety, public services, visual resources, cultural resources, recreational opportunities, and natural resources/habitats.

7.5 SWCA Environmental Consultants

Johnson, Craig – Senior Environmental Project Manager

Role: Visual Aspects Technical Reviewer

Education: BLA, Landscape Architecture

Expertise: 25 years' experience on a variety of projects, including wind, solar, and battery storage facilities, large-scale transmission lines and pipelines, and transportation assessments. He has comprehensive knowledge of the visual resource methodologies and techniques employed by the Bureau of Land Management (BLM), U.S. Forest Service (USFS), and Federal Highway Administration.

Rauhe, Kevin – Environmental Planner

Role: Visual Aspects Technical Author

Education: BLA, Landscape Architecture

Expertise: Nine years' experience with a background in landscape architecture specializing in visual resources, National Scenic and Historic Trails, land uses, recreation, wilderness, and specially designated federal lands. He has developed interdisciplinary methodologies to analyze National Scenic and Historic Trails and visual resources for linear projects through coordination with BLM, USFS, National Park Service, and state and local governmental staff.

7.6 Tetra Tech

Crookston, John – Biologist

Role: Purpose of Action Contributor

Education: MS, Ecology; BS, Biology

Expertise: 20 years of experience in federal, state, and local environmental permitting.

Fossum, Linnea – Senior Manager

Role: Purpose of Action Contributor

Education: MS, Environmental Engineering and Science; BA, Mathematics

Expertise: Over 25 years of experience in federal, state, and local environmental planning, permitting, environmental site investigations and remedial actions.

7.7 Authors of Supporting Technical Reports

The development of supporting technical reports was provided by Golder Associates Ltd., a member of WSP, and SWCA Environmental Consultants.

Wind Turbine Wildlife Collision Risk Assessment, Horse Heaven Wind Farm

Company: Golder Associates Ltd.

Authors: Ilya Povalyaev, RPBio; Kate Moss, RPBio; and Don Gamble, RPP, MCIP, RPBio

Horse Heaven Wind Farm Project, Final Visual Impact Assessment Report

Company: SWCA Environmental Consultants

Authors: Kevin Rauhe; Craig Johnson, PLA

8.0 CHAPTER 8 – GLOSSARY

adaptability *(4.6 Wildlife and Habitat)*	In biology, a species' ability to continue functioning after a disturbance.
aerodynamic sound *(4.11 Noise and Vibration)*	The sound produced from air flow and interaction with a turbine tower structure and moving rotor blades (as opposed to mechanical sound).
alluvial soil *(3.4 Water Resources; 4.4 Water Resources)*	Soil deposited by surface water.
anthropogenic *(3.5 Vegetation; 3.6 Wildlife and Habitat; 3.11 Noise and Vibration; 4.5 Vegetation; 4.6 Wildlife and Habitat)*	Caused or created by humans.
anticline *(3.2 Earth Resources)*	The high part of one or more geological units that have been folded by geological forces.
Applicant *(All sections)*	In this Environmental Impact Statement, Horse Heaven Wind Farm, LLC; the entity proposing to construct the Horse Heaven Wind Farm.
Application for Site Certification (ASC) *(All sections)*	Generally, an application submitted to the Washington Energy Facility Site Evaluation Council for a Site Certification Agreement permitting the development of an energy project in Washington State; specifically used in this Environmental Impact Statement to refer to the proposed Horse Heaven Wind Farm application.
aquifer storage and recovery (ASR) *(3.7 Energy)*	A water resources management technique in which water is stored in an underground aquifer for use during dry seasons.

archaeological resources *(3.9 Historic and Cultural Resources)*	Material remains of human activities that can provide information on the behavioral traits and environmental and cultural adaptations of a people.
architectural resources *(2.0 Proposed Action and Alternatives; 3.9 Historic and Cultural Resources; 4.9 Historic and Cultural Resources)*	Properties listed in the National Register of Historic Places or designated by a local historic preservation body, typically 50 years of age or older.
atmospheric stability *(3.3 Air Quality; 4.3 Air Quality)*	Lack of vertical air movement in the atmosphere, generally characterized according to the Pasquill-Gifford scheme, which ranges from Class A (most unstable) to Class G (most stable).
attainment area *(3.3 Air Quality)*	Area whose air quality complies with the National Ambient Air Quality Standards.
A-weighted sound level *(3.11 Noise and Vibration)*	Scale expressing relative loudness as perceived by the human ear, measured in A-weighted decibels (dBA).
balance of plant *(4.5 Vegetation; 4.16 Socioeconomics)*	All supporting and auxiliary parts of a power generation facility, not including the main facility.
balance of system *(4.16 Socioeconomics)*	All components of a photovoltaic energy generating system other than the photovoltaic panels.
battery energy storage system (BESS) *(All sections)*	Device that stores energy from renewable sources like solar and wind for later use.
before present (B.P.) *(3.9 Historic and Cultural Resources)*	Time prior to January 1, 1950, when radiocarbon dating can be used to estimate time since the death or burial of organic material.

CadnaA (Computer Aided Noise Abatement) *(4.11 Noise and Vibration)*	A computer program developed by DataKustik GmbH to assist in calculating noise propagation for major noise sources and projects.
carbon dioxide equivalent (CO_2e) *(4.3 Air Quality)*	A measure of the global warming potential of various greenhouse gases, expressed as the amount of carbon dioxide that would have the same global warming potential.
Cascadia Subduction Zone *(3.2 Earth Resources)*	Zone of contact between the Pacific, Gorda, Juan de Fuca, and Explorer tectonic plates that extends from northern Vancouver Island to Northern California, about 70 to 100 miles offshore and beneath the Pacific Coast of western North America.
comprehensive land use plan *(2.0 Proposed Action and Alternatives; 3.8 Land and Shoreline Use; 4.8 Land and Shoreline Use)*	A document that guides the land use decisions of a local government.
conditional use permit *(1.0 Project Background and Purpose and Need; 3.8 Land and Shoreline Use; 5.0 Cumulative Impacts)*	A permit that allows a use of land that does not conform to the standard zoning regulations for a given area.
Conservation Reserve Program *(2.0 Proposed Action and Alternatives; 3.5 Vegetation; 3.6 Wildlife and Habitat; 3.8 Land and Shoreline Use; 4.6 Wildlife and Habitat)*	A program administered by the Farm Service Agency, in which farmers receive a yearly payment in exchange for removing environmentally sensitive land from agricultural production.
considerable/considerably *(4.2 Earth Resources; 4.9 Cultural; 4.10 Visual Aspects, Light and Glare; 4.11 Noise and Vibration; 4.12 Recreation; 5.0 Cumulative Impacts)*	(In relation to impacts) In a distinctive manner or a noticeably measurable way.

corona, or corona effect *(4.11 Noise and Vibration)*	Ionization of the air that occurs at the surface of electrical conductors and power lines under some conditions, leading to loss of energy, audible noise, and release of ozone gas.
County Well Solar Field *(2.0 Proposed Action and Alternatives; 3.4 Water Resources; 3.5 Vegetation; 4.4 Water Resources; 4.5 Vegetation)*	One of the Horse Heaven Wind Farm's three proposed Solar Siting Areas.
Critical Aquifer Recharge Area (CARA) *(3.4 Water Resources; 4.4 Water Resources)*	An area that acts to recharge aquifers used for potable water, as defined by Washington Administrative Code 365-190-100.
daytime hours *(2.0 Proposed Action and Alternatives; 4.10 Visual Aspects, Light and Glare; 4.11 Noise and Vibration)*	The hours between 7 a.m. and 10 p.m.
diatomaceous earth *(3.2 Earth Resources)*	Soft sedimentary rock made of fossilized diatoms that once lived in bodies of water.
East Solar Field *(2.0 Proposed Action and Alternatives; 3.4 Water Resources; 3.5 Vegetation; 3.6 Wildlife and Habitat; 4.4 Water Resources; 4.5 Vegetation; 4.6 Wildlife and Habitat)*	One of the Horse Heaven Wind Farm's three proposed Solar Siting Areas.
edge effect *(4.5 Vegetation; 4.6 Wildlife and Habitat)*	A change in ecological conditions due to the meeting of two or more different habitat types, which causes the habitats to impact one another.

emissions factor *(4.3 Air Quality)*	The amount of pollutants produced in relation to the amount of raw materials processed, for a given industrial activity.
Energy Facility Siting Evaluation Council (EFSEC) *(All sections)*	Washington State agency that permits and coordinates the siting process for large energy projects in the state.
Environmental Justice *(3.16 Socioeconomics; 4.16 Socioeconomics)*	Equal protection from environmental health hazards regardless of race, color, national origin, or income, and equal access to the decision-making process regarding actions that affect the environment where people live, work, and learn.
ephemeral stream *(3.4 Water Resources; 4.4 Water Resources)*	A stream that flows only during, or immediately following, precipitation events and for which stormwater is the main water source.
evening hours *(4.11 Noise and Vibration)*	The hours between 6 p.m. and 10 p.m.
facultative *(3.4 Water Resources)*	Species that can occur in both wetland and non-wetland ecosystems.
federally obligated *(3.10 Visual)*	Describes an entity, such as an airport, that has accepted federal funds to buy land or develop or improve the facility.
ferruginous hawk nest *(3.6 Wildlife and Habitat; 4.6 Wildlife and Habitat)*	A nest constructed or occupied by a ferruginous hawk, regardless of activity status. Occurrences of ferruginous hawk nests may be reported through PHS data or field studies.
forb *(3.4 Water Resources; 3.5 Vegetation; 3.6 Wildlife and Habitat; 4.2 Earth Resources; 4.4 Water Resources; 4.5 Vegetation)*	A broad-leaved, non-woody flowering plant that is not a grass.

fugitive air emissions *(3.3 Air Quality)*	Gas or vapor emissions that do not pass through a chimney, smokestack, or similar facility.
glaciolacustrine *(3.2 Earth Resources)*	Having to do with a lake formed by the melting of glacier ice.
glare *(3.10 Visual Aspects, Light and Glare; 4.8 Land and Shoreline Use; 4.10 Visual Aspects, Light and Glare; 4.12 Recreation; 4.14 Transportation; 4.16 Socioeconomics; 5.0 Cumulative Impacts)*	Light reflected off of a stationary object.
glint *3.10 Visual Aspects; Light and Glare; 4.10 Visual Aspects; Light and Glare)*	A momentary flash of bright light, often caused by a reflection off a moving source.
global warming potential (GWP) *(4.3 Air Quality)*	A measure of how much heat a greenhouse gas will trap in the atmosphere over a specified period, compared to carbon dioxide.
greenhouse gas (GHG) *(3.3 Air Quality; 4.3 Air Quality)*	A gas that traps heat in the atmosphere, which is then reradiated back toward the earth's surface, warming the lower atmosphere and the earth's surface.

Growth Management Act (GMA) *(2.0 Proposed Action and Alternatives; 3.2 Earth Resources; 3.8 Land and Shoreline Use; 3.14 Transportation; 3.15 Public Services and Utilities; 3.16 Socioeconomics; 4.4 Water Resources; 4.8 Land and Shoreline Use; 4.11 Noise and Vibration; 4.12 Recreation; 4.15 Public Services and Utilities; 5.0 Cumulative Impacts)*	A Washington State law that requires state and local governments to manage growth by identifying and protecting critical areas and natural resource lands, designating urban growth areas, and preparing and implementing comprehensive land use plans (Revised Code of Washington Chapter 36.70A).
habitat concentration area (HCA) *(3.6 Wildlife and Habitat; 4.6 Wildlife and Habitat)*	An area of habitat that is expected or known to be important for specific species, based on survey data or modeling.
habitat fragmentation *(3.5 Vegetation; 3.6 Wildlife and Habitat; 4.5 Vegetation; 4.6 Wildlife and Habitat; 5.0 Cumulative Impacts)*	The process of segregating portions of habitat or ecosystems with anthropogenic features, which increases the potential for additional vectors to degrade habitat. For example, the construction of a road through a continuous patch of habitat could increase the potential for the introduction and spread of invasive plants that can continually degrade habitat beyond the initial loss of habitat.
hemispherical spreading *(4.11 Noise and Vibration)*	The decrease in level when a sound wave propagates away from a source uniformly in all directions aboveground.
Horse Heaven Wind Farm (Project, or Proposed Action) *(All sections)*	A proposed renewable energy generation facility that would be located in the Horse Heaven Hills area of Benton County, Washington; the facility analyzed in this Environmental Impact Statement.
Horse Heaven Wind Farm, LLC *(All sections)*	The entity applying for Site Certification for the proposed Horse Heaven Wind Farm.
illuminance *(3.10 Visual Aspects, Light and Glare; 4.10 Visual Aspects, Light and Glare)*	Measurement of the amount of light falling onto and spreading over a given surface area.

intermittent stream *(3.4 Water Resources; 4.4 Water Resources; 4.5 Vegetation; 4.6 Wildlife and Habitat; 5.0 Cumulative Impacts)*	A stream that contains water for only a portion of the year—typically, seasonally during winter and spring, when the channel is below the water table or when snow melt provides sustained flow.
inverse square law *(4.11 Noise and Vibration)*	A property in physics whereby an energy such as sound pressure (noise), varies with the distance from the source inversely as the square of the distance.
key observation point (KOP) *(3.10 Visual Aspects, Light and Glare; (4.10 Visual Aspects, Light and Glare; 4.12 Recreation)*	A typical or sensitive viewing location that represents a critical place from which the public would view a project; used to assess visual impacts.
lahar *(3.2 Earth Resources)*	A mudflow formed when volcanic ash and other debris mix with a water source that flows rapidly down a valley.
lake effect *(4.6 Wildlife and habitat)*	A phenomenon whereby some birds may misperceive solar panels as waterbodies and attempt to land on them, potentially resulting in injury or death.
landscape character *(3.10 Visual Aspects, Light and Glare; 4.2 Earth Resources; (4.10 Visual Aspects, Light and Glare)*	The overall visual appearance of a given landscape, including both natural features and human-created modifications.
landscape character area *(3.10 Visual Aspects, Light and Glare)*	Portions of a larger landscape that share harmonizing features that result in and exhibit a particular visual character.
Ldn *(3.11 Noise and Vibration)*	24-hour average sound pressure level, calculated with a 10 A-weighted decibel "penalty" added to nighttime hours (10 p.m. to 7 a.m.) to evaluate potential human response in residential land uses, where humans are more sensitive to nighttime noise impacts.

Lease Boundary *(Chapters 2 through 5)*	The area where the Horse Heaven Wind Farm would be located, comprising approximately 72,428 acres on Horse Heaven Hills in Benton County, Washington.
Leq *(3.11 Noise and Vibration)*	Sound pressure level averaged for a given sampling period.
level of service (LOS) *(3.14 Transportation; 4.14 Transportation; Public Services and Utilities)*	A qualitative measure of the experience of motorists using transportation infrastructure, based on factors such as congestion, delays, and traffic density; categorized into six levels, with Level A being the best experience and F being the worst.
light trespass *(3.10 Visual Aspects, Light and Glare; 4.6 Wildlife Habitat; 4.10 Visual Aspects, Light and Glare)*	Light falling where it is not intended or needed.
Lmax *(3.11 Noise and Vibration; 4.11 Noise and Vibration)*	Maximum sound pressure level during a given sampling period.
Lmin *(3.11 Noise and Vibration)*	Minimum sound pressure level during a given sampling period.
loess, loessial *(3.2 Earth Resources; 4.2 Earth Resources)*	Loosely compacted sandy silt deposited by wind.
mechanical sound *(3.11 Noise and Vibration)*	Relating to a wind turbine, the sound that is generated by the gearbox, generator, and cooling fan (as opposed to aerodynamic sound).

Micrositing Corridor *(2.0 Proposed Action and Alternatives; 3.4 Water Resources; 3.5 Vegetation; 3.6 Wildlife and Habitat; 3.8 Land and Shoreline Use; 3.9 Historic and Cultural Resources; 4.2 Earth Resources; 4.4 Water Resources; 4.5 Vegetation; 4.6 Wildlife and Habitat; 4.8 Land and Shoreline Use; 4.9 Historic and Cultural Resources; 4.13 Public Health and Safety; 4.14 Transportation; 5.0 Cumulative Impacts)*	Component of the Horse Heaven Wind Farm; the area where the turbine towers, access roads, crane paths, laydown areas, operations and maintenance facilities, meteorological towers, collector lines, and transmission lines would be located.
mill, millage *(3.16 Socioeconomics; 4.16 Socioeconomics)*	For taxation purposes, one mill is one dollar per $1,000 dollars of assessed value.
mitigation measure *(1.0 Project Background and Purpose and Need; 2.0 Proposed Action and Alternatives; 4.2 Earth Resources; 4.3 Air Quality; 4.4 Water Resources; 4.5 Vegetation; 4.6 Wildlife and Habitat; 4.7 Energy and Natural Resources; 4.8 Land and Shoreline Use; 4.9 Historic and Cultural Resources; 4.10 Visual Aspects, Light and Glare; 4.11 Noise and Vibration; 4.12 Recreation; 4.13 Public Health and Safety; 4.14 Transportation; 4.15 Public Services and Utilities; 4.16 Socioeconomics)*	An action intended to eliminate, reduce, control, or offset adverse effects of a project.
moment magnitude (expressed as M_W or M) *(3.2 Earth Resources)*	Scale that measures the energy released at an earthquake source.

motive power *(3.14 Transportation)*	The locomotive engines of a railroad system collectively.
nacelle *(2.0 Proposed Action and Alternatives; 3.10 Visual Aspects, Light and Glare; 3.14 Transportation; 4.5 Vegetation; 4.6 Wildlife and Habitat; 4.10 Visual Aspects; Light and Glare; 4.11 Noise and Vibration; 4.12 Recreation; 4.13 Public Health and Safety; 4.14 Transportation)*	The housing for the generator at the top of a wind turbine that is connected to the rotor.
nameplate generating capacity *(2.0 Proposed Action and Alternatives; 3.7 Energy and Natural Resources; 4.16 Socioeconomics; 5.0 Cumulative Impacts)*	The amount of electricity a generator can produce when running at its maximum designed output.
nest *(2.0 Proposed Action and Alternatives; 3.5 Vegetation; 3.6 Wildlife and Habitat 5.0 Cumulative Impacts)*	A structure built by a bird for the purpose of egg laying and rearing young. An active nest is a nest that is occupied by a bird, egg, or chick.
Natural Heritage Program (NHP) *(3.4 Water Resources; 3.5 Vegetation; 3.6 Wildlife and Habitat; 4.5 Vegetation; 4.6 Wildlife and Habitat)*	Washington's primary source of information about rare and endangered plant species and threatened ecosystems.
nighttime hours *(3.11 Noise and Vibration; 4.10 Visual Aspects, Light and Glare; 4.11 Noise and Vibration)*	The hours between 10 p.m. and 7 a.m.
nighttime operations *(4.11 Noise and Vibration)*	Work conducted between the hours of 10 p.m. and 7 a.m.

No Action Alternative *(2.0 Proposed Action and Alternatives; 3.10 Visual Aspects, Light and Glare; 3.12 Recreation; 3.14 Transportation; 3.16 Socioeconomics; 4.2 Earth Resources; 4.3 Air Quality; 4.4 Water Resources; 4.5 Vegetation; 4.6 Wildlife and Habitat; 4.7 Energy and Natural Resources; 4.8 Land and Shoreline Use; 4.9 Historic and Cultural Resources; 4.10 Visual Aspects, Light and Glare; 4.11 Noise and Vibration; 4.12 Recreation; 4.13 Public Health and Safety; 4.14 Transportation; 4.15 Public Services and Utilities; 4.16 Socioeconomics)*	A scenario under which a proposed project would not be built, used as a baseline against which to compare the impacts of building the project; in this Environmental Impact Statement, the No Action Alternative refers to the scenario of not building the Horse Heaven Wind Farm.
noise *(1.0 Project Background and Purpose and Need; 2.0 Proposed Action and Alternatives; 3.10 Visual Aspects, Light and Glare; 3.11 Noise and Vibration; 4.5 Vegetation; 4.6 Wildlife and Habitat; 4.8 Land and Shoreline Use; 4.9 Historic and Cultural Resources; 4.10 Visual Aspects, Light and Glare; 4.11 Noise and Vibration; 4.12 Recreation; 4.13 Public Health and Safety; 4.15 Public Services and Utilities; 4.16 Socioeconomics; 5.0 Cumulative Impacts)*	A sound that is “unwanted”—i.e., this term is based on human perception.
non-attainment *(3.3 Air Quality)*	The failure of a specified area to meet the National Ambient Air Quality Standards; areas that fail to meet this standard are designated “non-attainment” areas.

noxious weed *(2.0 Proposed Action and Alternatives; 3.5 Vegetation; 4.2 Earth Resources; 4.5 Vegetation; 4.6 Wildlife and Habitat; 4.10 Visual Aspects, Light and Glare)*	A weed that is harmful to agricultural or horticultural crops, natural habitats or ecosystems, or humans or livestock; in this Environmental Impact Statement, a plant legally designated as such in Washington State and Benton County.
ordinary high water level (OHWL) *(2.0 Proposed Action and Alternatives; 3.8 Land and Shoreline Use; 4.4 Water Resources)*	In a stream, river, or other waterbody, the elevation where the highest water level has been maintained for sufficient time such that physical evidence such as a change in vegetation, soil characteristics, or the presence of litter or debris is evident.
peak ground acceleration (PGA) *(3.2 Earth Resources)*	Largest acceleration experienced by the ground at a given location during earthquake shaking.
point source (of pollution) *(3.3 Air Quality; 4.3 Air Quality; 4.5 Vegetation; 4.11 Noise and Vibration)*	A single, stationary source of pollution.
Priority Habitat *(1.0 Project Background and Purpose and Need; 3.5 Vegetation; 3.6 Wildlife and Habitat; 4.4 Water Resources; 4.5 Vegetation; 4.6 Wildlife and Habitat; 5.0 Cumulative Impacts)*	Habitat that is given priority for conservation and management by the Washington Department of Fish and Wildlife; may refer to a unique vegetation association (e.g., shrub-steppe) or a particular habitat feature (e.g., cliffs).
priority species *(2.0 Proposed Action and Alternatives; 3.6 Wildlife and Habitat; 4.4 Water Resources; 4.5 Vegetation; 4.6 Wildlife and Habitat)*	In the State of Washington, species that are either state-listed as endangered, threatened, sensitive, or candidate species, or considered vulnerable.
Proposed Action *(All sections)*	The proposed Horse Heaven Wind Farm analyzed in this Environmental Impact Statement.

pyroclastic flow *(3.2 Earth Resources)*	Chaotic mixture of volcanic ash, hot cases, and rock debris, usually generated from the collapse of a volcanic eruption column.
resilience *(4.5 Vegetation; 4.6 Wildlife and Habitat)*	In biology, the ability of a species or ecosystem to recover from disturbance.
Revised Code of Washington (RCW) *(1.0 Project Background and Purpose and Need; 3.2 Earth Resources; 3.3 Air Quality; 3.7 Energy and Natural Resources; 3.8 Land and Shoreline Use; 3.9 Historic and Cultural Resources; 3.12 Recreation; 3.14 Transportation; 3.15 Public Services and Utilities; 3.16 Socioeconomics; 4.4 Water Resources; 4.5 Vegetation; 4.8 Land and Shoreline Use; Historic and Cultural Resources; 4.12 Recreation; 4.16 Socioeconomics)*	A compilation of all permanent state laws passed by the Washington State Legislature that are currently in effect.
sedentism *(3.9 Historic and Cultural Resources)*	Living in one place for an extended time.
Sellards Solar Field *(2.0 Proposed Action and Alternatives; 4.4 Water Resources; 4.5 Vegetation; 4.6 Wildlife and Habitat; 4.12 Recreation)*	One of the Horse Heaven Wind Farm’s three proposed Solar Siting Areas.

sensitive receptor *(3.10 Visual Aspects, Light and Glare; 3.11 Noise and Vibration; 4.2 Earth Resources; 4.3 Air Quality; 4.4 Water Resources; 4.5 Vegetation; 4.6 Wildlife and Habitat; 4.7 Energy and Natural Resources; 4.8 Land and Shoreline Use; 4.9 Historic and Cultural Resources; 4.10 Visual Aspects, Light and Glare; 4.11 Noise and Vibration; 4.12 Recreation; 4.13 Public Health and Safety; 4.14 Transportation; 4.15 Public Services and Utilities; 4.16 Socioeconomics)*	Locations where particularly vulnerable persons reside for extended periods, including day care centers, schools, nursing homes, hospitals, and other similar facilities.
shadow flicker *(3.10 Visual Aspects, Light and Glare; 4.10 Visual Aspects, Light and Glare)*	Moving shadow caused by a wind turbine's rotating blades, sometimes causing an impact on visual resources in the vicinity.
sherd *(3.9 Historic and Cultural Resources)*	A broken piece of ceramic material, common on archaeological sites.
Shoreline Management Act (SMA) *(1.0 Project Background and Purpose and Need; 3.8 Land and Shoreline Use; 4.12 Recreation)*	A Washington State law whose purpose is to manage and protect shorelines in the state by regulating development in shoreline areas (Revised Code of Washington Chapter 90.58).
Shoreline Master Program (SMP) *(3.8 Land and Shoreline Use; 4.4 Water Resources)*	Local land use policies and regulations that guide the use of shorelines in Washington State, required under the state Shoreline Management Act.
seiche *(3.2 Earth Resources; 4.2 Earth Resources)*	Oscillating water waves that can occur in any enclosed or partially enclosed waterbodies such as lakes and rivers; caused by earthquake shaking, volcanic activity, landslides, or extreme wind or weather events.

(soil) liquefaction *(2.0 Proposed Action and Alternatives; 3.2 Earth Resources; 4.2 Earth Resources)*	Temporary change of saturated sandy soil from a solid state to a state with properties more like a liquid than a soil; can occur during an earthquake.
solar array *(1.0 Project Background and Purpose and Need; 2.0 Proposed Action and Alternatives; 3.0 Visual Aspects, Light and Glare; 3.13 Public Health and Safety; 4.2 Earth Resources; 4.3 Air Quality; 4.4 Water Resources; 4.5 Vegetation; 4.6 Wildlife and Habitat; 4.7 Energy and Natural Resources; 4.8 Land and Shoreline Use; 4.9 Historic and Cultural Resources; 4.10 Visual Aspects, Light and Glare; 4.11 Noise and Vibration; 4.12 Recreation; 4.13 Public Health and Safety; 4.14 Transportation; 4.15 Public Services and Utilities; 4.16 Socioeconomics; 5.0 Cumulative Impacts)*	Collection of solar panels that generate electricity as a system.
Solar Siting Areas *(2.0 Proposed Action and Alternatives; 3.4 Water Resources; 3.5 Vegetation; 3.6 Wildlife and Habitat; 3.8 Land And Shoreline Use; 3.9 Historic and Cultural Resources; 4.2 Earth Resources; 4.4 Water Resources; 4.5 Vegetation; 4.6 Wildlife and Habitat; 4.9 Historic and Cultural Resources; Visual Aspects, Light and Glare; 5.0 Cumulative Impacts)*	The areas where the solar facilities for the Horse Heaven Wind Farm would be placed, totaling approximately 10,755 acres.

sound pressure level *(3.11 Noise and Vibration; 4.6 Wildlife and Habitat; 4.11 Noise and Vibration)*	Measure of sound wave pressure, expressed in decibels.
stability rose *(3.3 Air Quality)*	A type of graphic used by meteorologists to show typical wind direction and the atmospheric stability associated with each wind direction in a given area over a given time.
State Environmental Policy Act (SEPA) *(1.0 Project Background and Purpose and Need; 3.8 Land and Shoreline Use; 3.9 Historic and Cultural Resources; 4.2 Earth Resources; 4.3 Air Quality; 4.4 Water Resources; 4.5 Vegetation; 4.6 Wildlife and Habitat; 4.7 Energy and Natural Resources; 4.8 Land and Shoreline Use; 4.9 Historic and Cultural Resources; 4.10 Visual Aspects, Light and Glare; 4.11 Noise and Vibration; 4.12 Recreation; 4.13 Public Health and Safety; 4.14 Transportation; 4.15 Public Services and Utilities; 4.16 Socioeconomics; 5.0 Cumulative Impacts)*	Washington State’s most fundamental environmental law, enacted in 1971, whose purpose is to ensure that state and local agencies consider environmental impacts when making decisions regarding a proposed action.
syncline *(3.2 Earth Resources)*	The low part of one or more geological units that have been folded by geological forces.
traditional cultural property (TCP) *(3.9 Historic and Cultural Resources; 4.9 Historic and Cultural Resources)*	A natural place or built property that has cultural or religious significance to an indigenous group.
tsunami *(3.2 Earth Resources; 4.2 Earth Resources)*	Long-duration (minutes) ocean wave usually generated offshore by a large earthquake, submarine or near-shore landslide, or undersea volcanic eruption that displace the seafloor.

turbine, *see* wind turbine

Turbine Option *(2.0 Proposed Action and Alternatives; 3.8 Land and Shoreline Use; 3.10 Visual Aspects, Light and Glare; 4.2 Earth Resources; 4.3 Air Quality; 4.4 Water Resources; 4.5 Vegetation; 4.6 Wildlife and Habitat; 4.7 Energy and Natural Resources; 4.8 Land and Shoreline Use; 4.9 Historic and Cultural Resources; 4.10 Visual Aspects, Light and Glare; 4.11 Noise and Vibration; 4.12 Recreation; 4.13 Public Health and Safety; 4.14 Transportation; 4.15 Public Services and Utilities; 4.16 Socioeconomics)*	For the proposed Horse Heaven Wind Farm, one of two possible wind turbine layouts; Turbine Option 1 would include a larger number of smaller turbines, and Turbine Option 2 would include a smaller number of larger turbines.
Urban Growth Area (UGA) *(2.0 Proposed Action and Alternatives; 4.8 Land and Shoreline Use; 4.15 Public Services and Utilities)*	Generally, a designated area (such as a city) where urban growth and development are encouraged, and outside of which urban growth and development are discouraged or prohibited; under the Washington State Growth Management Act, counties in Washington State are required to designate UGAs in their comprehensive plans.
Vegetation Area of Analysis *(3.5 Vegetation; 4.5 Vegetation)*	The area of land analyzed for impacts on vegetation expected to result from the Horse Heaven Wind Farm; includes the Lease Boundary plus an additional 2-mile buffer.

Washington Administrative Code *(1.0 Project Background and Purpose and Need; 2.0 Proposed Action and Alternatives; 3.2 Earth Resources; 3.3 Air Quality; 3.4 Water Resources; 3.7 Energy and Natural Resources; 3.8 Land and Shoreline Use; 3.10 Visual Aspects, Light and Glare; 3.11 Noise and Vibration; 3.12 Recreation; 3.13 Public Health and Safety; 3.14 Transportation; 3.15 Public Services and Utilities; 4.2 Earth Resources; 4.3 Air Quality; 4.4 Water Resources; 4.5 Vegetation; 4.6 Wildlife and Habitat; 4.7 Energy and Natural Resources; 4.8 Land and Shoreline Use; 4.9 Historic and Cultural Resources; 4.10 Visual Aspects, Light and Glare; 4.11 Noise and Vibration; 4.12 Recreation; 4.13 Public Health and Safety; 4.14 Transportation; 4.15 Public Services and Utilities; 4.16 Socioeconomics)*	The administrative rules and regulations of executive branch agencies in the State of Washington.
Water Resource Inventory Area (WRIA) *(3.4 Water Resources)*	A watershed in the State of Washington, formalized in state law and managed by the Washington State Department of Ecology; there are 62 WRIAs in Washington.
wind farm *(All sections)*	A collection of wind turbines in the same location that act together as a single power station.
wind rose *(3.3 Air Quality; 4.3 Air Quality)*	A type of graphic used by meteorologists to show typical wind speeds and direction in a given area over a given time.
wind shear *(4.11 Noise and Vibration)*	Change in wind direction or speed over a relatively short distance.

wind turbine, *also* turbine	A machine consisting of a tall tower with large blades that rotate when pushed by wind and turn wind energy into electricity.
working hours *(2.0 Proposed Action and Alternatives; 4.11 Noise and Vibration)*	The hours between 7 a.m. and 6 p.m.

9.0 CHAPTER 9 – DISTRIBUTION

9.1 Federal Agencies

Bonneville Power Administration

Bureau of Land Management – Wenatchee Field Office

Department of Defense

National Park Service

U.S. Environmental Protection Agency, Region 10

U.S. Fish and Wildlife Services, Washington Office

Yakima Training Center

9.2 Tribal Governments

Coeur d’Alene Tribe

Columbia River Inter-Tribal Fish Commission

Confederated Tribes of the Chehalis Reservation

Confederated Tribes of the Colville Reservation

Confederated Tribes of the Umatilla Indian Reservation

Confederated Tribes of Warm Springs Reservation of Oregon

Confederated Tribes and Bands of the Yakama Nation

Cowlitz Indian Tribe

Hoh Indian Tribe

Kalispel Tribe

Lower Elwha Klallam Tribe

Lummi Nation

Makah Tribe

Muckleshoot Indian Tribe

Nez Perce Tribe

Nooksack Tribe

Northwest Indian Fisheries Commission

Port Gamble S’Klallam Tribe

Puyallup Tribe

Quileute Nation

Samish Indian Nation

Sauk-Suiattle Tribe

Shoalwater Bay Indian Tribe

Skokomish Indian Tribe

Snoqualmie Indian Tribe

Stillaguamish Tribe of Indians

Suquamish Tribe

Swinomish Indian Tribal Community

Tulalip Tribes

Upper Skagit Tribe

Wanapum Tribe

9.3 State Agencies

Washington State Department of Agriculture

Washington State Department of Archaeology and Historic Preservation

Washington State Department of Commerce

Washington State Department of Ecology

Washington State Department of Fish and Wildlife

Washington State Department of Health

Washington State Department of Natural Resources, SEPA Center

Washington State Department of Transportation, SEPA Reviews

Washington State Office of the Attorney General

Washington State Parks and Recreation Commission

Washington State Utilities & Transportation Commission

9.4 Regional Government

Badger Mountain Irrigation District

Benton Clean Air Agency

Benton County Board of Commissioners

Benton County Conservation District

Benton County Noxious Weed Control Board

Benton County Parks Service

Benton County Public Utility District (PUD)

Benton County Public Works

Benton Irrigation District

Benton Rural Electric Association

Douglas County

Kennewick Irrigation District

Spokane County

9.5 Local Government

City of East Wenatchee

City of Kennewick

City of Pasco

City of Richland

City of Walla Walla

City of Wenatchee

9.6 Libraries and Education Institutions

Mid-Columbia Libraries – Pasco Branch, Pasco, WA

Mid-Columbia Libraries – West Pasco Branch, Pasco, WA

Mid-Columbia Libraries – Prosser Branch, Prosser, WA

Mid-Columbia Libraries – Keewaydin Park Branch, Kennewick, WA

Mid-Columbia Libraries – Kennewick Branch, Kennewick, WA

Mid-Columbia Libraries – West Richland Branch, West Richland, WA

Richland Public Library, Richland, WA

Washington State Library, Tumwater, WA

9.7 Fire Departments/Districts

Benton County Fire Districts #1, #2, #3, #4, and #5

Kennewick Fire Department

Pasco Fire Department

Richland Township Fire Department

9.8 Other Parties

Benton County PUD

Puget Sound Partnership

Puget Sound Regional Council

Lower Columbia Basin Audubon Society

Scout Clean Energy

Sierra Club

Stoel Rives

The Nature Conservancy

TVW

South Central Department of Transportation

Washington Environmental Council

Washington Native Plant Society

This Page Intentionally Left Blank

APPENDIX 3.5-1

Habitat Subtype Photographs

This Page Intentionally Left Blank

Photo 1: Active wheat field representative of the agriculture habitat type (Tetra Tech 2021[1]).

Photo 2: Developed or disturbed habitat type (Tetra Tech 2021).

[1] Tetra Tech. 2021. 2021 Botany and Habitat Survey Report for Horse Heaven Wind Farm. Prepared for Horse Heaven Sind Farm, LLC by Tetra Tech. August 2021.

Photo 3: Eastside (interior) grassland along Badger Canyon (Tetra Tech 2021).

Photo 4: Non-native grassland dominated by cheatgrass (*Bromus tectorum*) and cereal rye (*Secale cereale*) (Tetra Tech 2021).

Photo 5: High-quality planted grassland dominated by native plants big bluegrass (*Poa secunda* ssp. *juncifolia*) and bluebunch wheatgrass (*Pseudoroegneria spicata*) (Tetra Tech 2021).

Photo 6: Dwarf shrub-steppe dominated by rock buckwheat (*Eriogonum sphaerocephalum*) and Sandberg bluegrass (*Poa secunda*) in the northwestern part of the Micrositing Corridor (Appendix K, Horse Heaven Wind Farm, LLC 2021[2]).

[2] Horse Heaven Wind Farm, LLC. 2021a. Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification. EFSEC. Docket Number: EF-210011. February 2021.

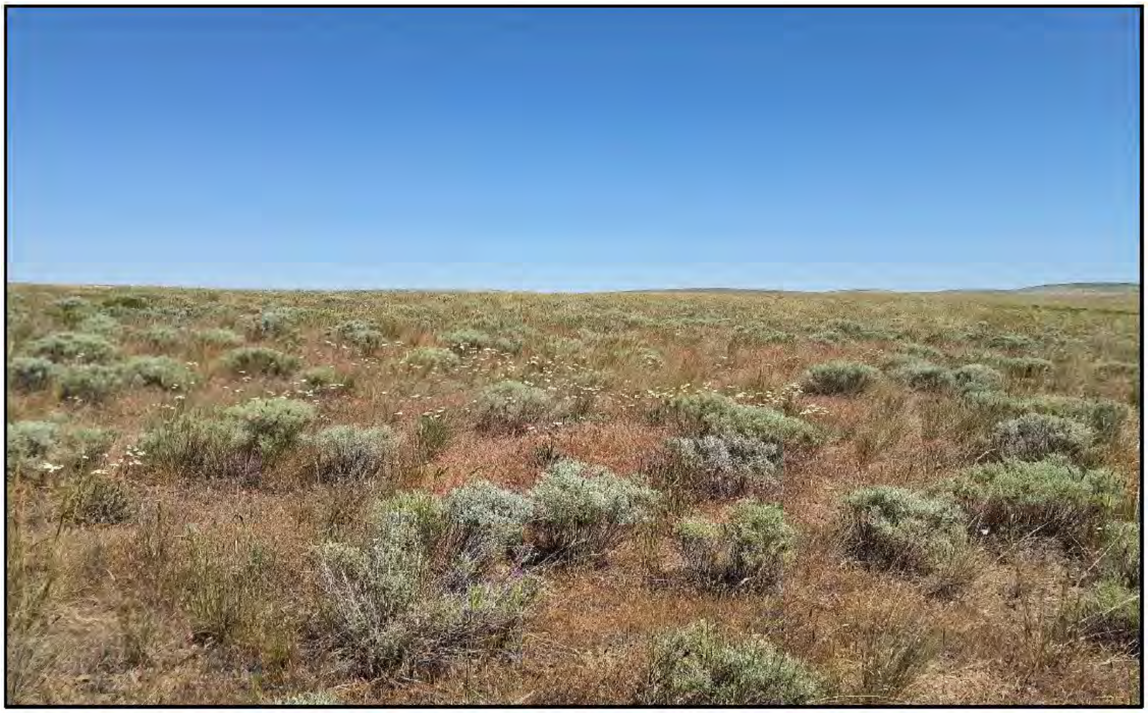


Photo 7: Rabbitbrush shrubland in area that was burned in 1990 during the Locust Grove Fire (Tetra Tech 2021).

Photo 8: Big sagebrush shrub-steppe habitat with evidence of disturbance from high cover of cheatgrass (Tetra Tech 2021).

APPENDIX 3.8-1

Land and Shoreline Use Consistency Analysis

This Page Intentionally Left Blank

Comprehensive Plan Analysis

Table 3.8-1A shows an analysis of the Project's consistency with the Benton County Comprehensive Plan's relevant goals and policies. Revised Code of Washington (RCW) 36.70B.040 requires that, at minimum, Growth Management Act (GMA) regulated counties and cities must consider the following four factors in determining a proposed project's consistency with their development regulations or, in the absence of applicable development regulations, with their comprehensive land use plans:

- The type of land use allowed, such as the land use designation
- The level of development allowed, such as units per acre or other measures of density
- Infrastructure, such as the adequacy of public facilities and services to serve a proposed project
- The characteristics of the proposed development, measured by the degree to which a project conforms to specific development regulations or standards

For aspects of the Project's design that are not in alignment with the Benton County Comprehensive Plan, EFSEC would review discrepancies through an adjudicative process intended to resolve disputes between the local government and the Applicant.

Table 3.8-1A: Benton County Comprehensive Plan Update Goals and Policies Consistency Analysis

Element Goal / Policy	Analysis
LU Goal 1: Ensure that land uses are compatible with surrounding uses that maintain public health, safety, and general welfare.	The Project is consistent with BCC zoning ordinance Chapter 11.17.070 Growth Management Act Agricultural District – Uses Requiring a Conditional Use Permit, which provides that commercial wind farms and major solar power generating facilities may be permitted within the GMA Agricultural District if a conditional use permit is issued by the Hearing Examiner.
LU Goal 1 Policy 1: Maintain a mix of land uses that supports the character of each rural community.	The Project is consistent with BCC zoning ordinance Chapter 11.17.070 Growth Management Act Agricultural District – Uses Requiring a Conditional Use Permit, which allows commercial wind farms with approval of a conditional use permit issued by the Board of County Commissioners.
LU Goal 1 Policy 3: Maximize the opportunities for compatible development within land use designations to serve a multitude of compatible uses and activities.	The Project is consistent with BCC zoning ordinance Chapter 11.17.070 Growth Management Act Agricultural District – Uses Requiring a Conditional Use Permit, which allows commercial wind farms with approval of a conditional use permit issued by the Board of County Commissioners.
LU Goal 6: Preserve rural lifestyles outside UGAs and incorporated areas while accommodating new population growth consistent with the protection of rural character.	The Project is consistent with BCC zoning ordinance Chapter 11.17.070 Growth Management Act Agricultural District – Uses Requiring a Conditional Use Permit, which allows commercial wind farms with approval of a conditional use permit issued by the Board of County Commissioners.
LU Goal 6 Policy 2: Development in rural areas is typified by large lots and less dense development. Favoring development that is less dense and has larger lots helps maintain the rural character of designated rural areas and supports the protection of ground and surface water.	The Project is consistent with BCC zoning ordinance Chapter 11.17.070 Growth Management Act Agricultural District – Uses Requiring a Conditional Use Permit, which allows commercial wind and solar farms with approval of a conditional use permit issued by the Board of County Commissioners.

Table 3.8-1A: Benton County Comprehensive Plan Update Goals and Policies Consistency Analysis

Element Goal / Policy	Analysis
LU Goal 6 Policy 3: Designated rural areas will be utilized to reduce the inappropriate conversion of agricultural lands, prevent sprawling low-density development and assure that rural development is compatible with surrounding rural and agricultural areas.	The Project is consistent with LU Goal 6 Policy 3 as agricultural practices within the Lease Boundary may be allowed to continue throughout the operations phase. Additionally, the Project's presence would prevent future low-density, sprawling development within the Lease Boundary.
LU Goal 6 Policy 14: Support and encourage the use of and application of Firewise principles and other fire risk reduction measures consistent with the Benton County Natural Hazard Mitigation Plan and Community Wildfire Protection Plan to reduce fire risk for urban development, urban subdivisions, rural subdivisions and large rural developments susceptible to wildfires. Encourage the implementation of the Firewise principles, or similar best management measures, applicable to individual lots on all lots at risk from wildfires.	Appendix P of the Applicant's ASC includes a Draft Emergency Response Plan that addresses fire prevention and calls for the preparation of a Fire Prevention Plan. If the Applicant complies with their Draft Emergency Response Plan and prepares a site-specific Fire Prevention Plan, the Project would be consistent with LU Goal 6 Policy 14.
LU Goal 6 Policy 15: Encourage new rural development away from the 100-year floodplain, and as guided in the County's Flood Damage Prevention Ordinance, CAO, and SMP.	The Project is consistent with LU Goal 6 Policy 15 as the Lease Boundary does not intersect the referenced special land use designations.
NR Goal 1: Conserve and maintain agricultural land of long-term commercial significance as the local natural resource most essential for sustaining the County's agricultural economy.	The Project is consistent with BCC zoning ordinance Chapter 11.17.070 Growth Management Act Agricultural District – Uses Requiring a Conditional Use Permit, which allows commercial wind and solar farms with approval of a conditional use permit issued by the BCC. Additionally, portions of the Project area would still be able to support agricultural activities.
NR Goal 1 Policy 1: Conserve areas designated "GMA Agriculture" in the Comprehensive Plan for a broad range of agricultural uses to the maximum extent possible and protect these areas from the encroachment of incompatible uses.	The Project is consistent with BCC zoning ordinance Chapter 11.17.070 Growth Management Act Agricultural District – Uses Requiring a Conditional Use Permit, which allows commercial wind and solar farms with approval of a conditional use permit issued by the Board of County Commissioners. Additionally, portions of the Project area would still be able to support agricultural activities.
NR Goal 1 Policy 3: Recognize that only uses related or ancillary to, supportive of, complementary to, and/or not in conflict with agricultural activities are appropriate in areas designated GMA Agriculture.	The Project is consistent with BCC zoning ordinance Chapter 11.17.070 Growth Management Act Agricultural District – Uses Requiring a Conditional Use Permit, which allows commercial wind and solar farms with approval of a conditional use permit issued by the Board of County Commissioners. Additionally, portions of the Project area would still be able to support agricultural activities.

Table 3.8-1A: Benton County Comprehensive Plan Update Goals and Policies Consistency Analysis

Element Goal / Policy	Analysis
WR Goal 1: Conserve, maintain, and manage existing ground and surface water resources to meet existing and future water supply needs for cities, farms, industry, and rural growth.	The ASC states that the Project would obtain water through a vendor agreement and that water obtained from the City of Kennewick's water system would be hauled to the site for the Project's construction, operations, and decommissioning phases. As part of their commitments, the Applicant has identified water conservation practices that the Project would apply throughout each phase of the Project. As a result of not drawing water directly from a surface water or groundwater source, the Project is consistent with WR Goal 1.
WR Goal 4: Protect and enhance surface water resources to support rivers, streams, and wetlands that support fish and wildlife species and associated habitats.	There are no major rivers or other perennial streams within the Project Lease Boundary; however, the ASC presents a list of Applicant commitments that would assist in minimizing off-site impacts from erosion, sedimentation, and stormwater runoff. Through the implementation of Applicant commitments, the Project would be consistent with WR Goal 4.
Critical Areas (CA) Goal 1: Protect the functions and values of critical areas within the county with land use decision-making and development review.	The Project is consistent with CA Goal 1 as the Applicant has submitted an ASC to EFSEC for review and EFSEC is preparing a SEPA-compliant EIS. Additionally, the Project would require a conditional use permit under Chapter 11.17.070 Growth Management Act Agricultural District – Uses Requiring a Conditional Use Permit from the Board of County Commissioners.
CA Goal 1 Policy 1: Apply standards, regulations, and mitigation strategies to development during the permitting and development approval process that protects critical areas functions and values.	The Project is consistent with CA Goal 1 Policy 1 as the Applicant has submitted an ASC to EFSEC for review that is inclusive of mitigation strategies in response to applicable regulations. Additionally, EFSEC is preparing a SEPA-compliant EIS that includes Applicant commitments and mitigation strategies that address potential impacts on critical areas.
CA Goal 2: Protect life and property and avoid or mitigate significant risks to public and private property and to public health and safety that are posed by frequently flooded and geologic hazard areas.	The Project is consistent with CA Goal 2 as it would be constructed in accordance with applicable codes and standards.
CA Goal 2 Policy 1: Limit developments in areas with higher risk for natural disaster or geologic hazard unless it can be demonstrated by the project proponent that the development is sited, designed, and engineered for long term structural integrity and that life and property on- and off-site are not subject to increased risk as a result of the development.	The Project is consistent with CA Goal 2 as it would be constructed in accordance with applicable codes and standards.
CA Goal 3: Protect the County's natural areas, shorelines, and critical areas as unique assets to the community.	The Project is consistent with CA Goal 3 as the Lease Boundary does not intersect a major river or other perennial streams.
CA Goal 3 Policy 1: Use the CAO, SMP, SEPA, and other ordinances, as applicable, to designate and protect critical areas and the natural environment.	The Project is consistent with CA Goal 3 Policy 1 as EFSEC is preparing a SEPA EIS that includes Applicant commitments and mitigation strategies that address potential impacts on critical areas.

Table 3.8-1A: Benton County Comprehensive Plan Update Goals and Policies Consistency Analysis

Element Goal / Policy	Analysis
CA Goal 5: Achieve balance among economic uses of land and critical areas protection.	The Project is consistent with CA Goal 5 as the Project's micrositing corridors are designed to avoid, where possible, Benton County's designated critical areas within the Project Lease Boundary. Where critical areas cannot be avoided, the Applicant proposes minimization and mitigation measures to protect critical areas functions and values.
CA Goal 5 Policy 1: Work with state, federal, and local agencies and other County stakeholders regarding the application of environmental protection laws and regulations.	The Project is consistent with CA Goal 5 Policy 1 as EFSEC is preparing a SEPA-compliant EIS.
ED Goal 2: Expand employment opportunities in unincorporated Benton County.	The Project is consistent with ED Goal 2 as it would have beneficial direct, indirect, and induced economic impacts within unincorporated Benton County for the construction, operations, and decommissioning phases.
ED Goal 3: Provide areas for the location of light and environmentally acceptable heavy industrial uses, while minimizing impacts on surrounding rural uses.	The Project is consistent with ED Goal 3 as it would allow for continued agricultural activities within the Lease Boundary.
ED Goal 3 Policy 2: Do not locate non-agricultural related industry on "GMA Agriculture" designated land.	The Project may not be in alignment with ED Goal 3 Policy 2; however, as currently designed, it would allow for continued agricultural activities within the Lease Boundary.
PL Goal 3: Conserve visually prominent naturally vegetated steep slopes and elevated ridges that define the Columbia Basin landscape and are uniquely a product of the ice age floods.	The Project is consistent with PL Goal 3 as it would not affect the prominent naturally vegetated steep slopes and elevated ridges that define the Columbia Basin landscape associated with the ice age floods.
PL Goal 3 Policy 1: Identify and preserve historically significant structures and sites whenever feasible.	The Project is consistent with PL Goal 3 Policy 1 as the Applicant's ASC documents archaeological and architectural surveys of the affected environment and states that the Project would be designed to avoid historically significant structures and sites.
PL Goal 4: Preserve significant historic structures, districts, and cultural resources that are unique to Benton County.	The Project is consistent with PL Goal 4 as the Applicant's ASC documents archaeological and architectural surveys of the affected environment and states that the Project would be designed to avoid historically significant structures and sites.
PL Goal 4 Policy 1: Coordinate with local tribes to protect historic and cultural resources.	The Project is consistent with PL Goal 4 Policy 1 as the Applicant's ASC provides documentation of tribal consultation.
PL Goal 4 Policy 2: Preserve archaeologically significant sites by siting and designing development to avoid or mitigate impacts.	The Project is consistent with PL Goal 4 Policy 2 as the Applicant's ASC documents archaeological surveys of the affected environment and states that the Project would be designed to avoid historically significant structures and sites.
UE Goal 2: Maintain public and private household water and sewer systems that are consistent with the rural character of the County.	The Project is consistent with UE Goal 2 as the Applicant's ASC states that water from the City of Kennewick's water system would be hauled to the site. Additionally, the Applicant's ASC states that the Project would discharge wastewater from the O&M facilities to an on-site septic system.

Table 3.8-1A: Benton County Comprehensive Plan Update Goals and Policies Consistency Analysis

Element Goal / Policy	Analysis
UE Goal 3: Facilitate efficiency in utility land use and development.	The Project is consistent with UE Goal 3 as the majority of the proposed transmission line route occurs on private property, where ongoing agricultural activity would occur along the corridors.
UE Goal 3 Policy 2: Encourage multiple uses, including passive recreational use, in utility corridors where practical.	The Project is consistent with UE Goal 3 Policy 2 as passive recreational uses within the proposed transmission line corridor would be possible on DNR land where practical. Additionally, the right-of-way for the transmission line would not be fenced.
UE Goal 3 Policy 3: Facilitate maintenance and rehabilitation of existing utility systems and facilities and encourage the use of existing transmission/distribution corridors.	The Project is consistent with UE Goal 3 Policy 3 as the transmission line connecting the Project's substations within the Project Lease Boundary would traverse parcels to optimize the most direct route between substations while minimizing potential environmental and agricultural impacts on surrounding lands. The eastern Project substation has been located adjacent to BPA's proposed Bofer Canyon substation, thereby eliminating the need for new transmission lines at this location. Proposed transmission lines would be located adjacent and parallel to existing public road right-of-way where possible.

Source: Benton County 2020; Horse Heaven Wind Farm, LLC 2021
Applicant = Horse Heaven Wind Farm, LLC; ASC = Application for Site Certificate; BCC = Benton County Code; BPA = Bonneville Power Administration; CA = Critical Areas; CAO = Critical Areas Ordinance; DNR = Washington State Department of Natural Resources; ED = Economic Development; EIS = environmental impact statement; GMA = Growth Management Act; LU = Land Use; NR = Natural Resources; O&M = operations and maintenance; PL = Parks, Recreation, Open Space, and Historic Preservation; SEPA = Washington State Environmental Policy Act; SMP = Shoreline Master Program; UE = Utilities Element; UGA = Urban Growth Area; WR = Water Resources

Consistency Analysis – Benton County Code (Zoning Ordinance)

Areas within Benton County that maintain critical agricultural resources are zoned in accordance with BCC 11.17.030, GMA Agricultural District. These areas are officially demarcated on the Official Zoning Map of Benton County and in the Benton County Comprehensive Plan (see Section 3.8).

Under the version of BCC 11.17.070 that was in effect when the ASC was filed with EFSEC, wind farms, major solar-generating facilities, and ancillary buildings and structures may be permitted within a GMA Agricultural District with approval of a conditional use permit. For any aspects of the Project's design that are not in alignment with Benton County Code (BCC) 11.17.070 Growth Management Act Agricultural District (as in effect at the time of application), EFSEC may consider in the adjudication whether inconsistent provisions should be preempted, and if so, whether any conditions should be included to serve the purpose of such provisions.

Table 3.8-2A presents the BCC requirements for the development of a commercial wind farm on land zoned GMA Agricultural District, as well as a consistency analysis between the Project and the ordinance requirement.

Table 3.8-2A: Benton County Zoning Ordinance Consistency Analysis

Ordinance Requirement	Consistency Analysis
11.17.070(q)(1). The lowest point on all rotor blades must be at least thirty (30) feet above ground level;	The Project is consistent with BCC 11.17.070(q)(1). The lowest point on the proposed turbine rotor blades would be 36.5 feet above ground level.
11.17.070(q)(2). All wind turbine tower bases must be set back from all dwellings not located on the same parcel at least one thousand six hundred and forty (1,640) feet;	The ASC states that each turbine tower base would be set back a conservative distance of at least 1,250 feet from all dwellings not located on the same parcel. Should the final turbine layout involve the placement of turbines closer than 1,640 feet from dwellings not located on the same parcel, the Project **would not be in alignment** with BCC 11.17.070(q)(2).
11.17.070(q)(3). All wind turbine tower bases must be set back from all property lines a distance equal to the associated wind turbine height plus 50 percent of that height, except that, where contiguous properties are leased for an identical duration for development of a wind farm, the tower bases set back from the property lines common with such leased properties may be eliminated so long as no part of any wind turbine extends past any such interior property lines and the above-required setbacks are maintained from the property lines comprising the exterior boundaries of the wind farm;	The Project **may not be in alignment** with BCC 11.17.070(q)(3) as the ASC states, "each turbine tower base is set back at least 499 feet or 671 feet from exterior property lines, depending on Turbine model, ensuring the setback is equal to or greater than the proposed maximum Turbine heights for Turbine Array Option 1 and Option 2 (ground to blade tip) of 499 feet and 671 feet, respectively." Using the formula provided in BCC 11.17.070(q)(3), the appropriate setback from all property lines where properties are not contiguously leased is 749 feet under Turbine Option 1 and 1,004 feet under Turbine Option 2.
11.17.070(q)(4). All wind turbine tower bases must be set back from the closest edge of a state, county, or city road right-of-way distance equal to the wind turbine height plus 50 percent of that height;	The Project **may not be in alignment** with BCC 11.17.070(q)(4) as the ASC states, each turbine tower base is set back at least 650 feet or 671 feet from the closest edge of any state and county road right-of-way within the Lease Boundary." Using the formula provided in BCC 11.17.070(q)(4), the appropriate setback from the closest edge of a state, county, or city road right-of-way is 749 feet under Turbine Option 1 and 1,004 feet under Turbine Option 2.
11.17.070(q)(5). All wind turbine tower bases must be set back a distance equal to the wind turbine height from all borders of the GMA Agricultural District, except for GMA Agricultural District borders adjacent to the Hanford Reservation owned by the Department of Energy or adjacent to another zoning district adopted by another county that contains a general minimum parcel size of at least twenty (20) acres per parcel;	The Project is consistent with BCC 11.17.070(q)(5). The ASC states that each turbine tower base is set back at least 499 feet or 671 feet from exterior property lines, including borders of the GMA Agricultural District. The setback distances are equal to or greater than the proposed maximum turbine heights for Option 1 and Option 2 of 499 feet and 671 feet, respectively. The Project would not be adjacent to the Hanford Reservation or another county.
11.17.070(q)(6). For wind turbine(s) proposed to be located within four (4) miles of the nearest point of the nearest runway of the nearest airport available for public use, the applicant for a building permit must comply with all the requirements imposed by the Federal Aviation Administration (FAA) and provide a written statement from the FAA that sets forth the FAA's comments and requirements, if any, for the proposal;	The Project is consistent with BCC 11.17.070(q)(6). No turbine locations are proposed within 4 miles of the nearest point of the nearest runway of the nearest airport available for public use, which is the Tri-Cities Airport. The nearest turbine would be located approximately 9.9 miles south of the Tri-Cities Airport.

Table 3.8-2A: Benton County Zoning Ordinance Consistency Analysis

Ordinance Requirement	Consistency Analysis
11.17.070(q)(7). All wind turbine(s) must comply with the Federal Aviation Regulations Part 77, Objects Affecting Navigable Airspace, as currently in effect or as hereafter amended, including but not limited to, providing such notices to the FAA as required thereunder and compliance with all requirements or prohibitions imposed by the FAA on the applicant's proposal;	The Project is consistent with BCC 11.17.070(q)(7). Per FAA regulations, the Project would provide a Notice of Proposed Construction or Alteration to the FAA and obtain a Determination of No Hazard prior to construction.
11.17.070(q)(8). Conditional use permit applications for the placement and operation of wind turbines under this section shall be made available for review by the United States Department of Defense (USDOD) in accordance with RCW 36.01.320, as in effect now or hereafter amended. The notice and processing of wind turbine permit applications will be in accordance with Benton County Code chapter 17.10. Pursuant to BCC 11.50.040 (d), the applicant is required to provide sufficient evidence to persuade the Hearings Examiner that the proposed wind turbine is compatible with other uses in the surrounding area, including any military training activities, or is no more incompatible than are any other outright permitted uses in the applicable zoning district, as well as provide all other evidence required by BCC 11.50.040;	The Project is consistent with BCC 11.17.070(q)(8). The Project layout avoids military training areas and would not interfere with military training activities.
11.17.070(q)(9). All wind turbine tower bases shall be located at least forty (40) feet for every one (1) foot of tower height or one mile, whichever is greater, from the ends of and at least five thousand (5,000) feet from the sides of all runways which are available solely for private use and identified on the most current edition of the Sectional Aeronautical Charts produced by the National Aeronautical Charting Office (NACO);	The Project is consistent with BCC 11.17.070(q)(9). The Project has been designed to locate turbines over 5,000 feet from the sides of all private runways identified on the most current edition of the Sectional Aeronautical Charts. Coopers Landing is the nearest runway available solely for private use and is located approximately 2 miles northeast of the Project's nearest turbine tower base. The private runway at Coopers Landing runs east to west. Based on this heading, no turbine under Option 1 or 2 would occur within 40 feet for every 1 foot of tower height from the ends of the runway, which is measured at 3.8 and 5.1 miles, respectively.
11.17.070(q)(10). If the use of any wind turbine or wind turbine farm is discontinued for a period of one (1) year or more, the owner of such facility shall remove the facility within ninety (90) days of written notification by the Planning Department. If such facility is not removed within said ninety (90) days, the County may refer the issue to the code enforcement officer for appropriate action pursuant to Chapter 11.43 BCC;	The Project is consistent with BCC 11.17.070(q)(10). The Project is expected to have an operational life of 35 years.

Table 3.8-2A: Benton County Zoning Ordinance Consistency Analysis

Ordinance Requirement	Consistency Analysis
11.17.070(q)(11). The wind turbine(s) and all associated service roads may not displace more than five (5) percent of the area of that parcel(s) on which they are located.	The Project is consistent with BCC 11.17.070(q)(11). Permanent disturbances associated with turbine tower foundation pedestals and permanent disturbances associated with the Project's new 16-foot-wide access roads would not displace more than 5% of the parcel area on which they are located.

Source: Benton County 2021; Horse Heaven Wind Farm, LLC 2021
Notes:
(a) Turbine Height = ground to blade tip height
ASC = Application for Site Certification; BCC = Benton County Code; FAA = Federal Aviation Administration; GMA = Growth Management Act; NACO = National Aeronautical Charting Office; RCW = Revised Code of Washington; USDOD = U.S. Department of Defense

Table 3.8-3A presents the five requirements under BCC 11.50.040(d) for when a conditional use permit may be issued by Benton County and response based on existing conditions and Project information.

Table 3.8-3A: Benton County Conditional Use Permit Requirements and Project Analysis

Conditional Use Permit Requirement	Project Comparison
(a) Is compatible with other uses in the surrounding area or is no more incompatible than are any other outright permitted uses in the applicable zoning district.	Nine Canyon Wind Farm received a permit from Benton County that allowed it to be constructed on Growth Management Act Agricultural District zoned land which indicates that the Project is not any less compatible than what has previously been permitted within the applicable zoning district.
(b) Will not materially endanger the health, safety, and welfare of the surrounding community to an extent greater than that associated with any other permitted uses in the applicable zoning district.	An analysis of Public Health and Safety is provided in Section 4.13.
(c) Would not cause the pedestrian and vehicular traffic associated with the use to conflict with existing and anticipated traffic in the neighborhood to an extent greater than that associated with any other permitted uses in the applicable zoning district.	An analysis of recreation and traffic is provided in Sections 4.12 and 4.14, respectively.
(d) Will be supported by adequate service facilities and would not adversely affect public services to the surrounding area.	An analysis of public services and utilities is provided in Section 4.15.
(e) Would not hinder or discourage the development of permitted uses on neighboring properties in the applicable zoning district as a result of the location, size or height of the buildings, structures, walls, or required fences or screening vegetation to a greater extent than other permitted uses in the applicable zoning district.	An analysis of project impacts on land use is provided in Section 4.8. The adjudication process for the Project would allow interested parties including neighbors to participate in the project's review process. Through this process, conditions may be placed upon the Project's construction and operations that address issues involving development of permitted uses on neighboring properties.

APPENDIX 3.10-1

Sky Glow Information and Comparisons

This Page Intentionally Left Blank

Sky Glow Information and Comparisons

The earliest measures of sky glow, also called sky brightness, were based on a scale upon which the magnitude of stars visible to the human eye is divided into six levels. The brightest star is a magnitude 1, and the dimmest (faintest) star is a magnitude 6. More recently, the magnitude scale was modified to express astronomical surface brightness (stars, planets, etc.) in units known as magnitudes per square arcsecond (mag/arcsec2) as measured by a Sky Quality Meter (SQM). The measurement scale is inverse and logarithmic and is generally used in small area photometry and astronomy (Bortle 2001).

Sky Glow Comparison Table

Class	Title	Approx. SQM mag/arcsec2
1	Excellent dark-sky site	21.7–22.0
2	Typical truly dark site	21.5–21.7
3	Rural sky	21.3–21.5
4	Rural/suburban transition	20.4–21.3
5	Suburban sky	19.1–20.4
6	Bright suburban sky	18.0–19.1
7	Suburban/urban transition	
8	City sky	< 18.0
9	Inner-city Sky	

Source: Bortle, John E. 2001. Gauging Light Pollution: The Bortle Dark-Sky Scale. Sky & Telescope. Sky Publishing Corporation. Accessed May 29, 2020. https://skyandtelescope.org/astronomy-resources/light-pollution-and-astronomy-the-bortle-dark-sky-scale/.
mag/arcsec^2 = magnitudes per square arcsecond; SQM = Sky Quality Meter

Examples of Typical Illuminance and Apparent Magnitude

Location	Classification	Illuminance[a] (lux)	Sky Brightness[b] (mag/arcsec^2)
Outdoor	Bright Sun	100,000–130,000	>0.1
	Hazy Day	32,000	1.3
	Partly Cloudy	25,000	1.6
	Cloudy	10,000	2.6
	Overcast	1,000	5.1
	Sunrise/Sunset on Clear Day	400	6.1
	Full Moon	0.1	15.1
	Moonless Clear Night Sky	0.001	20.1
	Moonless Overcast Night Sky	0.0001	22.6
	Starlight	0.00005	23.3

Examples of Typical Illuminance and Apparent Magnitude

Location	Classification	Illuminance[a] (lux)	Sky Brightness[b] (mag/arcsec^2)
Indoor	Typical TV Studio	1,000	5.1
	Bright Office with Large Contrast	400	6.1
	Hall Way	80	7.8
	Living Room	50	8.3
	Good Street Lighting	20	9.3
	Poor Street Lighting	1	12.6

Notes:
[a] G. R. Elion and H. A. Elion, 1979. Electro-Optics Handbook. CRC Press.
[b] Calculated based on conversion from lux to mags/arcsec^2
mag/arcsec^2 = magnitudes per square arcsecond; lux = luminous flux per unit area

APPENDIX 3.10-2

SWCA 2022 Visual Impact Assessment Report

This Page Intentionally Left Blank

Horse Heaven Wind Farm Project Final Visual Impact Assessment Report

APRIL 2022

PREPARED FOR

Washington Energy Facility Site Evaluation Council (EFSEC)

PREPARED BY

SWCA Environmental Consultants

HORSE HEAVEN WIND FARM PROJECT
FINAL VISUAL IMPACT ASSESSMENT REPORT

Prepared for

Washington Energy Facility Site Evaluation Council (EFSEC)
621 Woodland Square Loop SE
PO Box 43172
Olympia, Washington 98504-3172

Prepared by

SWCA Environmental Consultants
257 East 200 South, Suite 200
Salt Lake City, Utah 84111
(801) 322-4307
www.swca.com

SWCA Project No. 71229

April 2022

This page intentionally left blank.

CONTENTS

Attachments

Tables

This page intentionally left blank.

1 INTRODUCTION

In February 2021, the Washington Energy Facility Site Evaluation Council (EFSEC) received an Application for Site Certification (ASC) from Horse Heaven Wind Farm, LLC (the Applicant) proposing the construction and operation of the Horse Heaven Wind Farm Project (Project or Proposed Action). The ASC proposes the construction of a renewable energy generation facility that would have a nameplate energy generating capacity of up to 1,150 megawatts for a combination of wind and solar facilities as well as battery energy storage systems (BESSs). The 72,428-acre Lease Boundary is located on the Horse Heaven Hills south of Richland, Kennewick, and Benton City and is comprised mostly of private lands with some Washington Department of Natural Resources state trust parcels. The Project design includes the following components:

- Two wind turbine layout options
- Three potential solar array siting areas
- Up to five substations and associated transmission lines
- Three potential BESS locations
- An operation and maintenance (O&M) facility
- Other Project supporting infrastructure as depicted in Figures 1 and 2 in Attachment A

Additional details regarding the Project design are located in the Project ASC (Horse Heaven Wind Farm, LLC 2021a).[1]

The purpose of this report is to assist in EFSEC's determination of potential Project impacts under the Washington State Environmental Policy Act (SEPA), including significant unavoidable adverse impacts. Specifically, the report focuses on potential visual impacts resulting from modification of the landscape as well as the response of viewers to those features. Additionally, this report analyzes whether the Project would be consistent with and comply with state and local visual resource guidance. The information contained in this report was provided by the Applicant and supplemented with publicly available data where necessary. No additional fieldwork or simulations (beyond those provided in the ASC) were completed.

2 REGULATORY FRAMEWORK

The EFSEC process does not require a particular visual resource analysis method to be used. Instead, the goal is to describe the aesthetic impact of the proposed Project, provide the location and design of the facilities, depict how the Project will appear relative to the surrounding landscape, and describe procedures to restore or enhance the landscape disturbed during construction.

Both Washington State and the Benton County Comprehensive Plan provide guidance with regard to visual resources. As part of the EFSEC process, Washington Administrative Code 463-60-362(3) identifies the following standard for analysis of visual resource (aesthetics).

[1] The ASC can be viewed at the following website: Horse Heaven Application | EFSEC - The State of Washington Energy Facility Site Evaluation Council.

- The application shall describe the aesthetic impact of the proposed energy facility and associated facilities and any alteration of the surrounding terrain. The presentation will show the location and design of the facilities relative to the physical features of the site in a way that will show how the installation will appear relative to its surroundings. The applicant shall describe the procedures to be utilized to restore or enhance the landscape disturbed during construction (to include temporary roads).

Benton County has adopted planning goals and policies in their Comprehensive Plan (Benton County 2021) to conserve areas of potential value to the county and its residents. The following planning goals and policies noted below are most applicable to this visual analysis:

- PL Goal 3: Conserve visually prominent naturally vegetated steep slopes and elevated ridges that define the Columbia Basin landscape and are uniquely a product of the ice age floods.
    - Policy 4: Consider the preservation of the ridges and hillside areas through various development regulations.

These county goals and policies provide the intentions and interests of Benton County, rather than providing specific compliance requirements for this Project. No other federal, state, or local visual management requirements were identified for Project compliance.

The February 2021 Project ASC included a visual inventory and analysis within Section 4.2.3 (Horse Heaven Wind Farm, LLC 2021a), with an additional report submitted in October 2021 titled *Aesthetics Technical Memorandum for the Horse Heaven Wind Farm Project* (Horse Heaven Wind Farm, LLC 2021b). This memorandum, serving as the Applicant's visual analysis, focused mostly on the Visual Resource Management (VRM) System from the Bureau of Land Management (BLM), which has become an industry standard to analyze potential visual impacts, particularly in the western United States, and is often applied to projects on non-BLM lands. The BLM VRM as well as other federal agency visual resource methodologies (e.g., U.S. Forest Service scenery management system and U.S. Federal Highway Administration Guidelines for the Visual Impact Assessment of Highway Projects) have three common elements. These include

- Scenery: continuous units of land comprised of harmonized features that result in and exhibit a particular character,
- Views (sensitivity to visual change and visibility): public viewing locations including recreation areas, travel routes, residences, and lands with special management where viewers have sensitivity to landscape changes, and
- Agency visual management requirements: which identify allowable levels of change to landscape character and the allowable degree of attention the project could attract from viewing locations.

The application of the BLM VRM system in the Applicant's visual analysis document (Horse Heaven Wind Farm, LLC 2021b) did not include some elements typically required, including the completion of contrast rating worksheets from key viewpoints or consideration of all 10 BLM contrast factors. Of these 10 factors, the Applicant's visual analysis did not address the effect of motion and its influence on both landscape character and views. This report builds on the BLM VRM analysis provided in the ASC, including the effects of motion, and incorporates elements from *A Visual Impact Assessment Process for Wind Energy Projects* from the Clean Energy States Alliance (CESA) (CESA 2011) to evaluate and address the unique visual characteristics of wind energy projects. These combined methods are described further in Section 3 of this report.

3 AFFECTED ENVIRONMENT

To describe the Project's affected environment, this section outlines the inventory methods, describes the existing landscape character, and identifies potential viewing locations.

3.1 Inventory Methods

The visual resource area of analysis was identified in the ASC as the area within 10 miles of the proposed wind turbines and transmission line and within 5 miles of the proposed solar arrays, substations, and BESSs. Based on guidance from both the BLM (Sullivan et al. 2012) and CESA (2011), the area of analysis for the wind turbines was extended to 25 miles.

The visual resource inventory and impact assessment focused on three elements: landscape character, viewing locations, and compliance with state and county visual management guidance. These concepts are included both in the BLM VRM system and CESA process to identify potential impacts on visual resources. The methods for determining landscape character and viewing locations are described in the subsequent sections. Compliance with state and county visual management guidance (Section 2) is addressed in Section 4.2.2.6.

3.2 Existing Landscape Character

The term landscape character is used to describe the overall visual appearance of a given landscape, based on the visual aspects of the landscape's vegetation, landforms/water, and human-made modifications. Landscape character is often described in terms of landscape character areas, which are portions of a larger landscape that share harmonizing features that result in and exhibit a particular visual character.

The Project is located within the Columbia Plateau U.S. Environmental Protection Agency (EPA) Level III ecoregion (EPA 2010), which is typically characterized by a broad expanse of sagebrush-covered volcanic plains and valleys adjacent to the Columbia River and dotted with isolated mountains. There are landscape features in the area of analysis associated with a series of cataclysmic floods that occurred at the end of the most recent ice age, when glacially dammed lakes ruptured and large volumes of water rushed through the northwestern United States (National Park Service 2014).

The Lease Boundary is primarily characterized by the following features:

- Flat to rolling panoramic landscapes comprised of arid sagebrush steppe and grasslands that have been partially converted to agricultural lands.
- Topography gently slopes from north to south with a distinctive ridge located north of the Lease Boundary that connects the elevated sagebrush steppe to the Columbia River Valley.
- There are a series of minor drainageways that dissect the landscape with some forming small canyon settings.
- Due to the arid climate, there are limited trees within the Lease Boundary. Most trees visible in the Lease Boundary are associated with ornamental landscaping and windbreaks adjacent to residences, with the primary vegetation communities being agricultural lands with areas of remnant sagebrush steppe and grassland.
- Vegetation color in agricultural areas ranges from green to tan and brown depending on the season and the crop being grown. More vivid colors occur along the Columbia River Valley

associated with residential, commercial, and agricultural development that contrasts with the arid, muted colors found within the Lease Boundary.

The inventory of existing landscape character, based on CESA guidance, also considered the intactness of the landscape. This relates to the extent of modifications present in the existing landscape and their overall effect on natural patterns, which define the landscape. These modifications have the potential to create unintended focal points contrasting with the natural landscape character. There are three main landscape character areas that define the Lease Boundary's landscape character:

- **Plateau lands west of I-82:** The arid, rolling plateau lands west of the interstate are mostly intact with limited existing utility or other industrial uses. An existing transmission line traverses the western edge of the Lease Boundary, influencing the adjacent setting. There are also residences dispersed across this rural agricultural landscape, introducing geometric structures and additional vegetation in the setting associated with wind breaks and ornamental landscaping. The juxtaposition of residences and agricultural lands, including barns and other structures, create an agrarian landscape character common to the region.
- **Plateau lands east of I-82:** The landscape east of the interstate is similar to the western area but includes a series of wind turbine strings associated with the existing Nine Canyon Wind Project. There is also an existing transmission line that crosses the Lease Boundary near the west side of the existing Nine Canyon Wind Project and along the southern edge of the Lease Boundary adjacent to I-82. The influence of the existing landscape modifications extends throughout this landscape, reducing its level of intactness. The tall vertical form of the existing wind turbines and their movement attract attention within the setting, generally dominating the local landscape character.
- **Ridgeline:** This landscape is most prominent east of I-82 but continues to the west as a connection between the flat lands adjacent to the Columbia River and the elevated steppe lands. Due to the steep terrain, this area is visually prominent as viewed from the communities located north of the Lease Boundary. There are multiple paragliding launch sites along the ridge including Jump Off Joe, M&M Ridge, and Kiona. Additionally, there are two strings of the existing Nine Canyon Wind Project sited along the ridge and a communication tower, which reduce the intactness of the setting east of I-82.

3.3 Viewing Locations and Key Observation Points

While landscape character is focused on the visual characteristics of the overall landscape regardless of specific viewing locations, visibility of the Project from typical or sensitive viewing locations represent the most critical places from which the public would view the Project. These are commonly referred to as key observation points, or KOPs, and establish the platforms where impacts on views are assessed. KOP locations include static locations, such as residential areas, where views would occur from a consistent location, as well as linear KOPs, such as travel ways, where views change based on moving along a road or trail with varying potential impact levels.

In order to identify these KOP locations, a series of bare-earth viewshed analyses were run to depict the visibility of the Project from the surrounding area. The bare-earth modeling approach used in the viewshed analysis does not account for screening effects from vegetation or buildings that could block or partially block some views. In this manner, the bare-earth viewshed approach results in a conservative assessment of potential Project visibility. The analysis in the ASC included six viewsheds to compare visibility of the two turbine layout options, identify visibility of the three solar array siting areas, and provide visibility of the proposed transmission lines (Horse Heaven Wind Farm, LLC 2021b). These viewsheds were run out to the different areas of analysis associated with each of the Project components as described in Section 3.1. Based on the expansion of the area of analysis for the wind turbines from 10 miles to 25 miles, the viewsheds associated with the two turbine layout options were updated for this report to include this larger, regional setting. See Figures 3 through 8 in Attachment A for the results of these viewshed analyses.

Within the Applicant's visual resources area of analysis, results of the viewshed analyses and aerial photography were used to identify possible residential structures, travel ways, cultural resources with visual aspects, recreation, and other areas of interest including open space areas, to identify potential KOPs. These KOPs represent critical viewpoints, typical views in representative landscapes, and views of any special Project features. Additionally, the Applicant sought input from Benton County to identify potential areas of interest to local community members. Benton County noted interest on the part of residents located north of the Project. This area of interest contains a large number of residences as well as a series of parks and other recreation areas. The resulting list of potential KOPs were visited and photographed, and a series of KOPs were identified for analysis to represent the range of viewers and locations that would have views of the proposed Project infrastructure. In addition to these Applicant-selected KOP locations, supplementary viewing locations were considered to represent views from dispersed residences located directly adjacent to the proposed wind turbines and views from Horse Heaven Hills, a BLM-managed dispersed recreation area (BLM 2022).

Viewer reactions to changes in the landscape (viewer sensitivity) can vary depending on the characteristics and preferences of the viewer group. For example, residential viewers are typically expected to have a high concern for changes in views from their residences. These preferences may also vary depending on if the residential viewer is a Project participant or if views are from a non-participating property. Motorists' concern generally depends on when and where travel occurs, and the type of travel involved (e.g., commuting vs. recreational travel). Recreation users' concern for changes in views varies based on the activities occurring and how long viewers would have to analyze the landscape (view duration). For example, viewers at a scenic overlook would have a higher concern for changes in view, where the landscape would be viewed for a long duration and is integral to its use, compared to other recreation uses (e.g., birding) where the landscape is viewed for a shorter duration and is not the focus of the recreation activity.

The types of users in the visual study areas include residents of the adjacent Tri-Cities communities, including Benton City, Burbank, Kennewick, Pasco, Richland, West Richland, Finley, and Prosser; travelers on the various interstates and highways; recreators visiting the Rattlesnake, Red, Candy, and Badger mountains, McNary National Wildlife Refuge, and other recreational facilities in the area. Lands within the Lease Boundary are also of interest to the Confederated Tribes and Bands of the Yakama Nation, Confederated Tribes of the Umatilla Indian Reservation, and Nez Perce Tribe, who may attach cultural significance to natural landscape components.

The distance from the Project is a key factor in determining potential visual effects, with the amount of perceived contrast generally diminishing as distance between the viewer and the affected area increases (BLM 1986). Contrast is defined as the level of visible change to the existing features of the landscape (including landform/water, vegetation, and human-made structures) resulting from the introduction of a proposed project or management activity. The BLM VRM system and other visual resource systems establish a series of distance zones to identify visibility thresholds and inventory the existing landscape. For the purposes of this study, the distance to the Project (in miles) was used to identify viewing distance, with a particular focus on the foreground distance zone. This area corresponds to the area within 0.5 mile of the Project, where views of modifications in the landscape would be most prominent leading to views potentially dominated by Project infrastructure.

The list of viewing locations and KOPs used in this analysis as well as the associated viewer type, viewer sensitivity, and distance to the Project are presented in Table 1 and depicted on Figure 9 in Attachment A.

Table 1. Key Observation Point Locations Table

KOP Number	Viewer Name	Viewer Type	Viewer Sensitivity	Distance to Project	Description
1	McNary National Wildlife Refuge (NWR)	Recreation	Moderate	5.2 miles (wind turbines) Solar arrays, transmission lines, and substations/ BESSs would not be visible from this location.	Viewpoint is located along an unpaved road within the McNary NWR, looking southwest across the Columbia River towards the Project Lease Boundary.
2	S Clodfelter Road – East, Central, and West	Residential	High	3.0 miles (wind turbines) 3.4 miles (transmission line) Solar arrays and substations/BESSs would not be visible from this location.	Viewpoint is located along the south side of Manuel Drive, toward S. Clodfelter Road, looking southeast to southwest.
3	Chandler Butte	Recreation	High	2.5 miles (wind turbines) 2.1 miles (solar array) 4.2 miles (transmission line) The substations/BESSs would be visible from this location but would be outside of the photo frame.	Viewpoint is located along the unpaved road east of the communication towers, looking southeast.
4	I-82 South	Travel route	Moderate	7.0 miles (wind turbines) 6.0 miles (solar array) 6.5 miles (transmission line) The HH-East Substation/ BESSs would be visible from this location.	Viewpoint is located along the right shoulder of the highway, looking northwest to northeast.
5	Badger Mountain	Recreation	High	4.7 miles (wind turbines) Solar arrays, transmission lines, and substations/ BESSs would not be visible from this location.	Viewpoint is located along the southern side of the top of Badger Mountain looking southwest.
6	Bofer Canyon Road/I-82	Travel route	Moderate	1.7 miles (wind turbines) 0.6 mile (solar array) 1.2 miles (transmission line) The HH-East Substation/ BESSs would be visible from this location but would be outside of the photo frame.	Viewpoint is located along the right shoulder of the road, looking north.
7	Highway 221	Travel route, residential	High	5.8 miles (wind turbines) 3.1 miles (solar array) 2.2 miles (transmission line) The HH-West Substation/ BESSs would be visible from this location.	Viewpoint is located along the right shoulder of the highway, looking northeast.

KOP Number	Viewer Name	Viewer Type	Viewer Sensitivity	Distance to Project	Description
8	Kennewick (Canyon Lakes Area) – South and West	Residential	High	3.6 miles (wind turbines) 5.9 miles (solar array) 7.4 miles (transmission line) The substations/BESSs would not be visible from this location.	Viewpoint is located on the southwest end of S. Olson Street, looking west to south.
9	Benton City	Residential, travel route, commercial	High	2.7 miles (wind turbines) 3.9 miles (solar array) 5.5 miles (transmission line) The substations/BESSs would not be visible from this location.	Viewpoint is located on the east side of Division Street/State Route 225, looking south.
10	Badger Road	Residential, travel route	High	1.5 miles (wind turbines) 6.4 miles (solar array) 4.3 miles (transmission line) The substations/BESSs would not be visible from this location.	Viewpoint is located on the north side of Badger Road, looking southwest.
11	Highland/Finley Area	Residential	High	2.0 miles (wind turbines) 8.5 miles (solar array) 8.7 miles (transmission line) The substations/BESSs would not be visible from this location.	Viewpoint is located on the north side of E. Cougar Road near an entrance driveway to Finley Elementary School, looking southeast.
12	County Well Road	Residential, travel route	High	2.5 miles (wind turbines) 0.2 mile (solar array) 0.2 mile (transmission line) The HH-West (Alternative) Substation/BESSs would be visible from this location and located 0.5 mile away.	Viewpoint is located on the left shoulder of County Well Road, looking northeast.
13	Travis Road South of Sellards Road	Residential, travel route	High	1.1 miles (wind turbines) 1.0 mile (solar array located outside of photo frame) 0.1 mile (transmission line) The substations/BESSs would not be visible from this location.	Viewpoint is located on the right shoulder of Travis Road, looking north.
N/A	Dispersed residences located 0.5 mile from proposed turbines (foreground views)	Residential	High	Less than 0.5 mile (wind turbines) The other Project component distances would vary but are more specifically described from other KOP locations.	There are approximately 14 residences located within the foreground distance zone of the proposed wind turbines, less than 0.5 mile, with three of those identified as non-Project participating properties. Additionally, there are numerous residences located within 0.5 to1 mile of the proposed wind turbines.
N/A	Horse Heaven Hills Recreation Area	Recreation	Moderate	0.8 mile (wind turbines) Solar arrays, transmission lines, and substations/ BESSs would not be visible from this location.	Dispersed recreation including opportunities for hiking, nature viewing, and mountain biking with potential views of the Project to the south.

A series of visual simulations were prepared from KOPs 1 through 13, with both wind turbine options depicted, and are included in Attachment B. No simulations were developed from either of the un-numbered KOP viewing locations (e.g., Horse Heaven Hills Recreation Area or dispersed residences within foreground distance zone). Existing condition photographs were taken using standard focal lengths to most closely represent the human field of view. In order to create photographic simulations, a three-dimensional model of the turbine, solar array, and transmission line layouts were placed in the photographic view, taking into consideration Project topography (elevation) and distance from the observation point. Simulated turbines, solar arrays, and transmission lines were aligned to the photographs and the model rendered and composited to create the visualizations. Some of the KOP locations have multiple simulations looking in different directions, such as KOP 2, which includes potential views of the Project to both the southeast and southwest (Horse Heaven Wind Farm, LLC 2021b).

4 IMPACT ASSESSMENT

4.1 Method of Analysis

The Project visual analysis focuses on three elements: landscape character, viewing locations, and compliance with state and county visual management guidance. The CESA methods suggest three evaluation criteria as they relate to identifying if impacts rise to the magnitude of "undue" or "unreasonable" (CESA 2011):

- Does the project violate a clear written aesthetic standard intended to protect the scenic values or aesthetics of the area or a particular scenic resource?
- Does the project dominate views from highly sensitive viewing areas or within the region as a whole?
- Has the developer failed to take reasonable measures to mitigate the significant or avoidable impacts of the project?

Table 2 outlines the SEPA impact rating factors used for this visual impact assessment, including magnitude, duration, likelihood, and spatial extent of impacts. Table 3, in consideration of BLM and CESA methods, further describes the degrees of magnitude in Table 2 (negligible, low, medium, and high), as they relate to the visual impact analysis elements that form the foundation of this assessment. As identified in Table 3, the determination of impact magnitude is based on impacts to landscape character, impacts to viewing locations, and compliance with state and county visual resource requirements. These determinations are primarily focused on the concept of project contrast, which is a measure of the overall visual changes to existing features of the landscape (including landform/water, vegetation, and human-made structures) resulting from the construction, operation, and decommissioning of a project. The level of project contrast is assessed using the categories of slight, weak, moderate, and strong, which directly align with the magnitude of change degrees of negligible, low, medium, and high.

Other concepts from the CESA methods were included to evaluate and address the unique visual characteristics of wind energy projects. For the assessment of impacts on landscape character, this includes modifications to the existing setting, which may reduce the setting's overall level of intactness. With regard to impacts on views, the concepts of project dominance, prominence with the setting, and the extent of viewshed occupied by the project (i.e., extent of horizontal view occupied by Project) were included from the CESA methods. These concepts build upon the BLM VRM's 10 environmental factors that influence the amount of visual contrast introduced by a project (BLM 1986):

- Distance

- Angle of observation
- Length of time the project is in view
- Relative size or scale
- Season of use
- Lighting conditions
- Recovery time
- Spatial relationships
- Atmospheric conditions
- Motion

Of particular importance for a project with wind turbines is the influence of motion to attract attention and increase the level of visual contrast within view, compared to static elements (e.g., solar arrays, transmission lines).

Table 2. Impact Rating

Factor	Rating			
Magnitude	Negligible *indistinguishable from the background*	Low *Small impact, non-sensitive receptor(s)*	Medium *intermediate impact, may occur on sensitive receptor(s) or affect public health and safety*	High *high impact on sensitive receptor(s) or affecting public health and safety*
Duration	Temporary *infrequently during any phase*	Short-term *duration of construction or site restoration*	Long-term *during operation or operation plus another phase of Project*	Constant *during life of Project and/or beyond the Project*
Likelihood	Unlikely *not expected to occur*	Feasible *may occur*	Probable *expected to occur*	Unavoidable *inevitable*
Spatial Extent/Setting	Limited *small area of Lease Boundary or beyond Lease Boundary if duration is temporary*	Confined *within Lease Boundary*	Local *beyond Lease Boundary to neighboring receptors*	Regional *beyond neighboring receptors*

Table 3. Criteria for Assessing Magnitude of Impacts to Visual Resources

Magnitude of Impacts	Description
Negligible	**Landscape character:** landscape would appear unaltered and Project components would not attract attention. Project components would repeat form, line, color, texture, scale and/or movement common in the landscape and would not be visually evident. **Viewing locations:** contrast introduced by the Project would be slight and would be subordinate to existing landscape features and would not be readily seen from viewing locations. Project components would repeat elements or patterns common in the landscape. **State and county visual resource requirements:** Project would be consistent with state and county visual management requirements.

Magnitude of Impacts	Description
Low	**Landscape character:** landscape would be noticeably altered, and Project components would begin to attract attention in a partially intact visual setting. Project components would introduce form, line, color, texture, scale, and/or movement common in the landscape and would be visually subordinate (weak contrast). **Viewing locations:** A weak level of contrast would be introduced by the Project. The Project would occupy a small portion of the viewshed, and would be subordinate to existing landscape features, as seen from viewing locations. **State and county visual resource requirements:** Project would be consistent with state and county visual management requirements after implementation of mitigation measures.
Medium	**Landscape character:** landscape would appear to be considerably altered and Project components would begin to dominate a partially intact visual setting. Project components would introduce form, line, color, texture, scale, and/or movement not common in the landscape and would be visually prominent in the landscape (moderate contrast). **Viewing locations:** a moderate level of contrast would be introduced by the Project, attracting attention from viewing locations. The Project would be prominent in the existing landscape and co-dominate from viewing locations where the form, line, color, texture, scale, and/or movement of Project components would be moderately incongruent with existing landscape features. **State and county visual resource requirements:** Project would be partially consistent with state and county visual management requirements, and the implementation of mitigation measures would not sufficiently reduce impacts.
High	**Landscape character:** landscape would appear to be strongly altered and Project components would dominate an intact visual setting. Project components would introduce form, line, color, texture, scale, and/or movement not common in the landscape and would be visually dominant in the landscape (strong contrast). **Viewing locations:** a strong level of contrast would be introduced by the Project, demanding attention. The Project would be highly prominent and dominate views from viewing locations where the form, line, color, texture, scale, and/or movement of Project components would be highly incongruent with existing landscape features, including existing structures. A strong level of contrast may also be introduced if the Project components occupy a large portion of the viewshed from a given viewpoint. **State and county visual resource requirements:** Project would be inconsistent with state and county visual management requirements, and the implementation of mitigation measures would not sufficiently reduce impacts.

To support the visual impact discussions, the following visual terminology is used in this report as defined below:

- Viewer position (angle of observation)
  - Inferior: viewer is located below the Project in elevation.
  - Level: viewer is at the same elevation as the Project.
  - Superior: viewer is located above the Project in elevation.
- Project visibility factors
  - Screening: an existing visual barrier (landforms, vegetation, or structures) blocks or limits views of the Project, reducing the level of contrast introduced by the Project.
  - Unobstructed: views of the Project would not be screened by landforms, vegetation, or structures allowing for the extent of the Project to be visible.
  - Skylining: the Project would appear above the horizon or ridgeline, silhouetting its form against the sky attracting additional attention in the landscape.
  - Backdropping: distant hills or mountains would appear behind the Project potentially reducing contrast introduced by its form, line, color, and texture as those elements would appear to blend with the existing setting.

Since impacts on visual resources considered effects on scenery and on views from multiple KOPs, the summary impact level (i.e., magnitude of impact) at the end of each discussion focuses on the highest identified impacts.

4.2 Impacts of Proposed Action

4.2.1 Impacts during Construction

The construction of the Project would introduce form, line, color, texture, scale, and movement inconsistent with the existing landscape character and would modify views from the identified KOP locations. These short-term impacts would result from the construction of Project facilities as well as construction of new access roads and associated vegetation clearing. Because the Applicant has committed to active dust suppression, as described in Section 1.10 Mitigation Measures of the ASC, potential visual impacts associated with visible dust plumes is not considered in this assessment. Impacts associated with Project lighting or glare is considered in the draft environmental impact statement for the Project. The following sections describe visual/aesthetic impacts associated with the different Project components.

4.2.1.1 TURBINE OPTION 1

Impacts on visual resources would be elevated during construction activities, including the movement of vehicles that would attract attention, due to increased activity at proposed temporary staging areas and throughout the Lease Boundary. The construction of access roads, crane paths, collector and communication lines, and the wind turbines would be prominent when viewed within the foreground distance zone (0–0.5 mile) and would begin to modify the existing landscape setting.

During construction, the removal of vegetation and earthwork would introduce areas of exposed soil, which would contrast with the existing setting until vegetation is later reclaimed. The construction of access roads in the level to rolling terrain in the analysis area would require minimal modification of the existing terrain, resulting in negligible long-term visual impacts. Impacts common to all KOPs during construction would include views of additional vehicular traffic and areas of exposed soil after the removal of vegetation and during earthwork activities. Viewers located within the foreground distance zone (0–0.5 mile), or in locations where views would be occupied by a large portion of the Project under construction, would result in increased visual contrast on these views.

These impacts would be most intense during the 23-month construction schedule (as described in the ASC and in Chapter 2 of the draft environmental impact statement for the Project) and would diminish after construction is complete and vegetation has been re-established. Following the initial seeding, completed after construction, the Applicant would continue to monitor these revegetation areas for 3 to 5 years and apply remedial actions in order to meet the success criteria outlined in Appendix N of the ASC (Horse Heaven Wind Farm, LLC 2021a). Construction activities for Turbine Option 1 would result in medium, short-term, probable, local impacts on visual resources.

4.2.1.2 TURBINE OPTION 2

Impacts would be similar to Turbine Option 1. Because there are fewer proposed wind turbines requiring less ground disturbance for construction, there would be a reduced level of contrast and fewer modifications to the existing landscape character introduced during Project construction when compared to Turbine Option 1. However, the ratings of impacts are consistent between the two turbine options as construction of either option would occupy a large portion of the landscape contrasting with its existing character. Construction activities for Turbine Option 2 would result in medium, short-term, probable, local impacts on visual resources.

4.2.1.3 SOLAR ARRAYS

The construction of the solar arrays would result in similar impacts as the wind turbines but would occur within a smaller, more defined area associated with the selected solar array site. Within the fenced boundary, all lands would be distributed through earthwork, vegetation clearing, and other construction efforts. Application of mitigation measures would reduce these impacts to the extent practicable to minimize these short-term visual impacts as described in Section 4.2.4. Construction activities for the solar arrays would result in low, short-term, probable, local impacts on visual resources.

4.2.1.4 SUBSTATIONS

Impacts from construction of the substations would be similar to the solar arrays, with the addition of multiple linear transmission lines connecting the proposed substations to the existing electrical grid. The construction of the transmission lines would include vegetation clearing within the right-of-way and construction of a series of tall, vertical structures. During construction, the motion associated with construction equipment, structure building, and conductor stringing, as well as vegetation clearing and landform modification would be noticeable and create visual contrast within the viewshed. Construction activities for the substations and transmission lines would result in low, short-term, probable, local impacts on visual resources.

4.2.1.5 BATTERY ENERGY STORAGE SYSTEMS

Impacts would be similar to the proposed solar arrays and substations, with these proposed BESS sites located adjacent to the proposed substation locations. The construction of the BESSs would introduce additional motion from construction equipment into the setting. Additionally, the removal of vegetation and earthwork would introduce areas of exposed soil, which would contrast with the existing setting until vegetation has been restored. Construction activities for the BESSs would result in low, short-term, probable, local impacts on visual resources.

4.2.1.6 COMBINED IMPACTS OF COMPONENTS

During the 23-month construction schedule, there would be short-term impacts from construction activities occupying a large portion of the landscape when considering all of the Project components (i.e., wind turbines, solar arrays, collector lines, access road, multiple transmission lines and substations, O&M facility, and the BESSs). This would include views of additional vehicular traffic as well as areas of exposed soil after the removal of vegetation and during earthwork activities. The removal of vegetation would be noticeable in the setting and contrast with the existing character; however, over time, after vegetation is reclaimed in temporary disturbance areas, it would begin to repeat vegetation patterns common in the area.

Viewpoints and KOPs located within the foreground distance zone (0–0.5 mile) would be most impacted by the construction of multiple Project components, particularly when a large portion of their viewshed is occupied by construction activities. These short-term impacts are anticipated to extend beyond the neighboring receptors, resulting in potential regional impacts from more distant viewpoints where construction activities would occupy a large portion of their viewshed. Construction disturbance would be limited to the extent practicable in accordance with best management practices (BMPs) and the Project's site certificate conditions. After construction is completed, areas of temporary disturbance, including temporary access roads no longer used as Project access roads, would be reclaimed to appear similar to their original condition. In general, vegetated areas that are temporarily disturbed or removed during construction of the Project would be revegetated to blend with adjacent undisturbed lands with these areas being monitored for 3 to 5 years postconstruction to meet a series of success criteria outlined in the

Project's Revegetation and Noxious Weed Management Plan (Horse Heaven Wind Farm, LLC 2021a: Appendix N). Areas with soil compaction and disturbance from construction activities would also be revegetated in accordance with the Project's Revegetation and Noxious Weed Management Plan.

In summary, activities during construction of all components of the Project would result in medium, short-term, probable, regional impacts on visual resources.

4.2.2 Impacts during Operation

The introduction of the Project into the setting would result in long-term modifications to the existing landscape's form, line, color, and texture, and would modify views from the identified KOP locations to varying degrees. Although impacts would depend on a variety of viewing conditions, one overall concept to note is that the visual impacts associated with the Project tend to change considerably with distance. These effects would be most impactful on residential, travel route, and recreation viewers located within the foreground distance zone (0–0.5 mile), where the Project would create strong vertical and horizontal forms and lines that would contrast with the primarily organic forms of the existing setting. There are 13 residences located on non-participating properties that would have foreground views (less than 0.5 mile) of either the proposed turbines or solar arrays.

Impacts on views from the middleground (0.5–5 miles) would vary based on the extent of existing modifications in view. For locations with views of the existing Nine Canyon Wind Project, or where the existing transmission lines dominate the existing view, the Project would typically result in medium impacts and would be viewed as co-dominant within the existing setting. From viewpoints where existing modifications do not currently attract attention, the Project would dominate views since a large portion of the viewshed would typically be occupied by large, spinning wind turbines. From this distance, the individual turbines tend to visually "merge" with other turbines in the string from some viewing angles, resulting in the turbines appearing larger in mass and scale.

From more distant views, within the background distance zone (more than 5 miles away), the proposed wind turbines would appear as vertical lines with a faint spinning motion of the blades—particularly where seen skylined above ridges or other highpoints within the landscape. The proposed solar arrays and other Project components would be mostly indiscernible from the background distance zone.

4.2.2.1 TURBINE OPTION 1

Under Turbine Option 1, impacts to landscape character would range from high to medium. The Project would generally dominate the existing landscape character through the introduction of a large number of vertical protrusions that would be out of scale with and highly prominent in the landscape. The turbines would be most prominent where sited near the Horse Heaven Hills ridgeline, resulting in high impacts on landscape character. These structures would also introduce spinning movement into the landscape, which would attract attention throughout the area of analysis—particularly where the existing Nine Canyon Wind Project is not visible. Impacts to landscape character would be medium near the existing Nine Canyon Wind Project since this portion of the landscape—particularly the area east of I-82—has already been modified. In general, the existing level of landscape intactness would be diminished, resulting in landscapes characterized by energy generation, compared to the existing agrarian landscape character.

Impacts on key views would range from high to medium. Table 4 provides an overview of the impacts from each KOP/viewpoint, and includes the viewer position, the extent of the horizontal view occupied by the Project, the level of contrast, and the magnitude of impact.

In summary, activities during operation of Turbine Option 1 would result in areas of high, long-term, unavoidable, regional impacts on visual resources.

4.2.2.2 TURBINE OPTION 2

The Project, under Turbine Option 2, would have similar high impacts on landscape character as Option 1. There would be fewer structures introduced into the setting under this option, which would result in less visual clutter, however, due to the increased height of the structures in Option 2, these effects would be balanced, resulting in overall similar effects. The additional height of Option 2 turbines would be more prominent near the Horse Heaven Hills ridgeline or adjacent to existing landscape modifications where the increased vertical forms would be most evident.

Table 5 describes the impacts on views from the KOPs and other viewing locations associated with Turbine Option 2. In summary, activities during operation of Turbine Option 2 would result in areas of high, long-term, unavoidable, regional impacts on visual resources.

Table 4. Key Observation Point/Viewpoint Impact Table – Turbine Option 1

KOP #	Viewer Name	Viewer Type	Distance to Project	Viewer Position	Approx. Extent of Horizontal View Occupied by Project	Level of Visual Contrast	Magnitude of Impact	Impact Description
1	McNary NWR	Recreation	5.2 miles	Inferior	80 degrees	Moderate	Medium	The tall, proposed turbines would be similar in appearance to the existing Nine Canyon Wind Project, also visible from this location, but the proposed turbines would be larger and out of scale with the existing landscape. Views would be unobstructed toward the Lease Boundary. The prominence of the proposed wind turbines rising above the landscape, including additional motion introduced by the spinning turbine blades, would further attract attention from viewers and dominate the existing landscape character. Because visitors and travelers would be visiting for a limited time, the level of contrast would be reduced by the short view duration limiting the influence of the Project on these views. The Project would expand the extent of view occupied by moving wind turbines and would be prominent from this inferior viewing angle, resulting in medium, long-term impacts on views.
2	S Clodfelter Road – East, Central, and West	Residential	3.0 miles	Inferior	200 degrees	Strong	High	The proposed turbines would dominate views from this location, approximately 3 miles away, as a large portion of the viewshed would include moving wind turbines. Views of the Project in open, rolling hills would be unobstructed. Views toward the east would include the existing Nine Canyon Wind Project, which occupies only a narrow portion of the landscape as viewed from this location. The series of proposed skylined wind turbines would be highly prominent in the view, resulting in high, long-term impacts on views, particularly where views of multiple wind turbines would overlap and appear larger in mass.
3	Chandler Butte	Recreation	2.5 miles	Superior	50 degrees	Strong	High	The proposed turbines would dominate views from this location, approximately 2.5 miles away, as a moderate portion of the viewshed would include moving wind turbines. Views of the Project in an open plains landscape would be unobstructed, with views of the existing Nine Canyon Wind Project occurring approximately 20 miles away on the distant hills. Due to the superior viewing angle, the contrast between the light color of the turbines and the darker color of the ground would create strong visual contrast, visible to recreationists along Chandler Butte. The series of proposed wind turbines would be highly prominent in the view resulting in high, long-term impacts on views, particularly where views of multiple wind turbines would overlap and appear larger in mass.

KOP #	Viewer Name	Viewer Type	Distance to Project	Viewer Position	Approx. Extent of Horizontal View Occupied by Project	Level of Visual Contrast	Magnitude of Impact	Impact Description
4	I-82 South	Travel route	7.0 miles	Inferior	100 degrees	Moderate	Medium	The proposed turbines would attract attention from this location, approximately 7 miles away, as a large portion of the viewshed would include moving wind turbines. Due to the distance, the turbine's form would be distinguishable, but the texture and color would be muted and less detailed. Views from I-82 include an existing transmission line and the Nine Canyon Wind Project, approximately 12 miles away, with these existing features influencing but not dominating views from this location. As travelers drive I-82 from this point to KOP 6, approximately 10 miles, impacts on views of the proposed wind turbines would incrementally increase. From this location, the turbines would be viewed unobstructed and skylined, which would attract attention—particularly where only moving turbine blades would be seen over the horizon. The impacts on these views would be medium and long term.
5	Badger Mountain	Recreation	4.7 miles	Level	150 degrees	Strong	High	The proposed turbines would dominate views from this location, approximately 5 miles away, as a large portion of the viewshed would include moving wind turbines. Views of the Project in open, rolling hills would be unobstructed, with views of the Project occurring beyond developed lands of Badger and the Horse Heaven Hills ridgeline. The series of proposed skylined wind turbines would be highly prominent in the view, resulting in high, long-term impacts on views—particularly where views of multiple wind turbines would overlap and appear larger in mass.
6	Bofer Canyon Road/I-82	Travel route	1.7 miles	Level	120 degrees	Strong	High	The proposed turbines would be viewed in context with an existing transmission line from this KOP. The existing transmission line has introduced strong vertical lines into the existing setting. Due to the proximity of the proposed turbines (less than 2 miles), the introduction of movement into the landscape, and the extent of view occupied by these structures, the Project would dominate views from this location along Bofer Canyon Road and I-82. These impacts would continue to increase as viewers would pass the existing transmission line into an area where views of the proposed turbines would be highly prominent as viewed both to the east and west. Based on the landscape modifications introduced by the proposed wind turbines, the Project would result in high, long-term impacts on views.

KOP #	Viewer Name	Viewer Type	Distance to Project	Viewer Position	Approx. Extent of Horizontal View Occupied by Project	Level of Visual Contrast	Magnitude of Impact	Impact Description
7	Highway 221	Travel route, residential	5.8 miles	Level	70 degrees	Moderate	Medium	The proposed turbines would be viewed in context with a distant existing transmission line, which has introduced a series of skylined structures along the horizon. The proposed turbines would, however, appear larger and out of scale with the features of the existing landscape. Views would be unobstructed toward the Lease Boundary. The prominence of the proposed wind turbines rising above the landscape, including the introduction of motion, would further attract attention from viewers and modify the existing landscape character. The Project would be prominent within a moderate portion of the viewshed, resulting in medium, long-term impacts on views.
8	Kennewick (Canyon Lakes Area) – South and West	Residential	3.6 miles	Inferior	170 degrees	Strong	High	The proposed turbines would dominate views from this location, approximately 3.5 miles away, as a large portion of the viewshed would include moving wind turbines. Views of the Project in open, rolling hills would be unobstructed with views toward the west including an existing transmission line. Views to the southeast include the existing Nine Canyon Wind Project, which occupies a narrow portion of the landscape as viewed from this location. The series of proposed skylined wind turbines would be highly prominent in the view resulting in high, long-term impacts on views, particularly where views of multiple wind turbines would overlap and appear larger in mass.
9	Benton City	Residential, travel route, commercial	2.7 miles	Inferior	10 to 80 degrees (based on level of screening)	Moderate	Medium	The proposed wind turbines would be intermittently screened by development within Benton City, with partial screening of the Project features occurring where the Horse Heaven Hills would partially obstruct views to the south. Where visible, there would be a limited number of turbines in view, as depicted in the visual simulation (Attachment B). The presence and motion of the turbines would attract attention but would appear co-dominant with other commercial and residential developments. Views from other areas within the city may have more expansive, unobstructed views of the proposed wind turbines similar to KOPs 2 and 10. The Project would expand the extent of view occupied by moving wind turbines and would be prominent from this inferior viewing angle, resulting in medium, long-term impacts on views.

KOP #	Viewer Name	Viewer Type	Distance to Project	Viewer Position	Approx. Extent of Horizontal View Occupied by Project	Level of Visual Contrast	Magnitude of Impact	Impact Description
10	Badger Road	Residential, travel route	1.5 miles	Inferior	150 degrees	Strong	High	The proposed turbines would dominate views from this location, approximately 1.5 miles away, as a large portion of the viewshed would include moving wind turbines. Views of the proposed wind turbines, from an inferior viewing angle, would be partially screened by topography and intermittently screened by development. Movement associated with the turbine blades would be highly visible, particularly where only the blades would visible, repeatedly rising over the hills. Based on the level of contrast introduced by the proposed wind turbines, which are much larger in scale than existing modifications in view, the Project would result in high, long-term impacts on views.
11	Highland/ Finley Area	Residential	2.0 miles	Inferior	100 degrees	Strong	High	The proposed turbines would dominate views from this location, approximately 2 miles away, as a large portion of the viewshed would include moving wind turbines. Views of the Project on the Horse Heaven Hills would be unobstructed, with views toward the southwest including residential and agricultural development, as well as the existing Nine Canyon Wind Project, which occupies a moderate portion of the landscape as viewed from this location. The series of proposed skylined wind turbines would be highly prominent in the view, resulting in high, long-term impacts on views, particularly where views of multiple wind turbines would overlap and appear larger in mass.
12	County Well Road	Residential, travel route	2.5 miles	Level	100 degrees	Moderate	Medium	The proposed turbines would be viewed in context with an existing transmission line. The existing transmission line has modified the existing setting, including the introduction of distinct, vertical lines. Due to the proximity of the proposed turbines (approximately 2.5 miles), the introduction of movement into the landscape, and the extent of view occupied by these structures, the Project would attract attention and begin to dominate views from this location. In consideration of the existing modifications in view, the Project would result in medium, long-term impacts on views from this location. These impacts would continue to increase as viewers would pass the existing transmission line into an area where views of the proposed wind turbines would be prominent.

KOP #	Viewer Name	Viewer Type	Distance to Project	Viewer Position	Approx. Extent of Horizontal View Occupied by Project	Level of Visual Contrast	Magnitude of Impact	Impact Description
13	Travis Road South of Sellards Road	Residential, travel route	1.1 miles	Level	150 degrees	Strong	High	The proposed turbines would dominate views from this location, approximately 1 mile away, as a large portion of the viewshed would include moving wind turbines. Views of the Project in open, rolling hills would be unobstructed within a mostly intact existing landscape. The series of proposed skylined wind turbines would be highly prominent in the view, resulting in high, long-term impacts on views, particularly where views of multiple wind turbines would overlap and appear larger in mass.
N/A	Dispersed residences located 0.5 mile from proposed turbines (foreground views)	Residential	Less than 0.5 mile	Level	Up to 300 degrees	Strong	High	The proposed turbines would dominate views from dispersed residences located within the foreground distance zone (includes views from participating and non-participating properties). These views would be most impacted where views of the existing Nine Canyon Wind Project and existing transmission lines would be screened with the proposed turbines dominating a viewshed with limited existing modifications. The prominence of the proposed wind turbines rising above the landscape, including additional motion introduced by the turbine blades, would further attract attention from viewers and dominate the existing landscape character, resulting in high, long-term impacts on views from these locations. Viewers located on participating properties may have less visual sensitivity to modifications introduced by the Project, compared to viewers located on non-participating properties, but the level of visual contrast and Project dominance would remain the same.
N/A	Horse Heaven Hills Recreation Area	Recreation	0.8 mile	Superior, level, and inferior	Up to 140 degrees	Strong	High	Views from the Horse Heaven Hills Recreation Area vary based on location, with elevated views represented by KOP 3, located on Chandler Butte, to inferior views occurring below the ridgeline and similar to KOPs 9 and 10. In general, views from this recreation area would be highly impacted where the Project would modify a large portion of the viewshed through the introduction of moving wind turbines. While hiking on trails below the ridge but within the recreation area, views may be partially screened by topography where visitors would only see the moving turbine blades repeatedly rising over the ridgeline as described for KOP 10. Viewers along the ridgeline trail would be located directly adjacent to the proposed turbines, where views would be strongly altered by the Project. The series of proposed wind turbines would be highly prominent in the view, resulting in high, long-term impacts on views from Chandler Butte, below the ridgeline trails, and from the ridgeline trail.

Table 5. Key Observation Point/Viewpoint Impact Table – Turbine Option 2

KOP #	Viewer Name	Viewer Type	Distance to Project	Viewer Position	Approx. Extent of Horizontal View Occupied by Project	Level of Visual Contrast	Magnitude of Impact	Impact Description
1	McNary NWR	Recreation	5.8 miles	Inferior	80 degrees	Moderate	Medium	Impacts would be similar to Option 1 except the taller turbines would be more prominent as viewed on the ridgeline. There would be fewer turbines in view, resulting in a less cluttered appearance, but since the proposed turbines would be larger in scale (and even larger as compared to the existing Nine Canyon Wind Project), the Project would result in medium, long-term impacts on views.
2	S Clodfelter Road – East, Central, and West	Residential	3.5 miles	Inferior	200 degrees	Strong	High	Impacts would be similar to Option 1 except the taller turbines would be more prominent as viewed on the ridgeline. There would be fewer turbines in view, resulting in a less cluttered appearance, particularly where views of multiple wind turbines would overlap and appear larger in mass. Since the proposed turbines would be larger in scale (and even larger as compared to the existing Nine Canyon Wind Project), the effects of a less cluttered view would be counterbalanced, resulting in high, long-term impacts on views.
3	Chandler Butte	Recreation	2.8 miles	Superior	50 degrees	Strong	High	Impacts would be similar to Option 1 except the taller turbines would be more prominent across the landscape. There would be fewer turbines in view, resulting in a less cluttered appearance, particularly where views of multiple wind turbines would overlap and appear larger in mass. Since the proposed turbines would be larger in scale (and even larger as compared to the existing Nine Canyon Wind Project), the effects of a less cluttered view would be counterbalanced, resulting in high, long-term impacts on views.
4	I-82 South	Travel route	7.3 miles	Inferior	100 degrees	Moderate	Medium	Impacts would be similar to Option 1 except the taller turbines would result in fewer turbines within view. The presence of fewer turbines would produce a less cluttered appearance, particularly where views of multiple wind turbines would overlap and appear larger in mass. Since the proposed turbines would be larger in scale (and even larger as compared to the existing Nine Canyon Wind Project), the effects of a less cluttered appearance would be counterbalanced, resulting in medium, long-term impacts on views

KOP #	Viewer Name	Viewer Type	Distance to Project	Viewer Position	Approx. Extent of Horizontal View Occupied by Project	Level of Visual Contrast	Magnitude of Impact	Impact Description
5	Badger Mountain	Recreation	4.7 miles	Level	150 degrees	Strong	High	Impacts would be similar to Option 1 except the taller turbines would be more prominent as viewed on the ridgeline. There would be fewer turbines in view, resulting in a less cluttered appearance, particularly where views of multiple wind turbines would overlap and appear larger in mass. The relative scale of the turbines proposed for Option 2, compared to Option 1, would be apparent as views include residential and agricultural development, providing a source of scale comparison.
6	Bofer Canyon Road/I-82	Travel route	1.8 miles	Level	120 degrees	Strong	High	Impacts would be similar to Option 1 but slightly increased in magnitude. The taller turbines proposed under this option would be apparent due to the existing transmission line providing a source of scale comparison, and most of the turbines proposed adjacent to this viewpoint would occur regardless of the option selected.
7	Highway 221	Travel route, residential	5.8 miles	Level	70 degrees	Moderate	Medium	Impacts would be similar to Option 1 except the taller turbines would be more prominent as viewed from the highway. There would be fewer turbines in view, resulting in a less cluttered appearance, but since the proposed turbines would be larger in scale (and even larger as compared to the existing transmission line in view), the Project would result in medium, long-term impacts on views.
8	Kennewick (Canyon Lakes Area) – South and West	Residential	5.4 miles	Inferior	170 degrees	Moderate	Medium	Impacts on views would be reduced under Option 2, as the closest proposed wind turbine would be more than 1.5 miles further away compared to Option 1 (approximately 5.4 miles). There would also be fewer turbines in view, resulting in a less cluttered appearance. However, since the proposed turbines would be larger in scale, (and even larger as compared to the existing Nine Canyon Wind Project), the Project would result in medium, long-term impacts on views.
9	Benton City	Residential, travel route, commercial	2.7 miles	Inferior	10 to 80 degrees (based on level of screening)	Moderate	Medium	Impacts would be similar to Option 1 but slightly increased in magnitude. The taller turbines proposed under this option would be more prominent and most of the turbines proposed adjacent to this viewpoint would occur regardless of the option selected.

KOP #	Viewer Name	Viewer Type	Distance to Project	Viewer Position	Approx. Extent of Horizontal View Occupied by Project	Level of Visual Contrast	Magnitude of Impact	Impact Description
10	Badger Road	Residential, travel route	1.5 miles	Inferior	150 degrees	Strong	High	Impacts would be similar to Option 1 except the taller turbines would be more prominent as viewed from this area. There would be fewer turbines in view resulting in a less cluttered appearance, but since the proposed turbines would be larger in scale, (and even larger as compared to the existing modifications in view), the Project would result in high, long-term impacts on views.
11	Highland/ Finley Area	Residential	2.5 miles	Inferior	100 degrees	Strong	High	Impacts would be similar to Option 1, except the taller turbines would be more prominent as viewed on the ridgeline. There would be fewer turbines in view, resulting in a less cluttered appearance, particularly where views of multiple wind turbines would overlap and appear larger in mass. Since the proposed turbines would be larger in scale, (and even larger as compared to the existing Nine Canyon Wind Project), the effects of a less cluttered appearance would be counterbalanced, resulting in high, long-term impacts on views.
12	County Well Road	Residential, travel route	2.5 miles	Level	100 degrees	Moderate	Medium	Impacts would be similar to Option 1 but slightly increased in magnitude. The taller turbines proposed under this option would be apparent due to the existing transmission line that provides a source of scale comparison.
13	Travis Road South of Sellards Road	Residential, travel route	1.1 miles	Level	150 degrees	Strong	High	Impacts would be similar to Option 1 but slightly increased in magnitude. The taller turbines proposed under this option would be apparent due to the existing development in view, which provides a source of scale comparison.
N/A	Dispersed residences located 0.5 mile from proposed turbines (foreground views)	Residential	Less than 0.5 mile	Level	Up to 300 degrees	Strong	High	Impacts would be similar to Option 1 except the taller turbines would be more prominent as viewed from these residences. There would be fewer turbines in view, resulting in a less cluttered appearance. Since the proposed turbines would be larger in scale, the Project impacts would be most apparent where the existing Nine Canyon Wind Project or transmission lines are visible and provide a source of scale comparison. The Project would result in high, long-term impacts on views.
N/A	Horse Heaven Hills Recreation Area	Recreation	0.8 mile	Inferior	Up to 140 degrees	Strong	High	Impacts would be similar to Option 1 except the taller turbines would be more prominent as viewed from this recreation area. There would be fewer turbines in view, resulting in a less cluttered appearance. However, since the proposed turbines would be larger in scale (and even larger as compared to the existing modifications in view), the Project would result in high, long-term impacts on views.

4.2.2.3 SOLAR ARRAYS

The Project would introduce forms, lines, colors, and textures associated with the photovoltaic arrays that are inconsistent with the existing landscape character. The conversion of existing agricultural lands to large expanses of photovoltaic panels would result in visual contrast through their flat, geometric forms and dark, slightly reflective surfaces, which are not common in the setting. The addition of the repetitive, vertical upright features associated with the solar trackers and additional fenced land would be noticeable in this rolling, panoramic landscape.

The Project would be visually prominent in the setting, resulting in medium to high impacts on landscape character. Based on the viewshed analysis from the *Aesthetics Technical Memorandum for the Horse Heaven Wind Farm Project* (Horse Heaven Wind Farm, LLC 2021b), the County Well Road (see Figure 5 in Attachment A) and Sellards Road (see Figure 6 in Attachment A) solar siting areas would be the most visible options, influencing a larger portion of the landscape, 45% and 51% respectively, within the 5-mile-wide area of analysis. These solar array siting areas would also occur in an area with a more intact existing landscape, as compared to the Bofer Canyon siting area, resulting in more intense impacts on landscape character. The Bofer Canyon option is located in proximity to the existing Nine Canyon Wind Project, which has introduced large-scale energy infrastructure into the landscape. The viewshed analysis identified that 31% of the area within the 5-mile-wide area of analysis would be influenced by the proposed solar arrays within the Bofer Canyon Siting Area (see Figure 7 in Attachment A).

Table 6 describes the impacts on views from the KOPs and other viewing locations associated with the three proposed solar array siting areas. In summary, activities during operation of any of the three solar array options would result in areas of (at minimum) medium, long-term, unavoidable, regional impacts on visual resources, with the County Well Road and Bofer Canyon siting areas resulting in areas of high, long-term, unavoidable, local impacts as viewed from identified KOP locations.

Table 6. Key Observation Point/Viewpoint Impact Table – Solar Array

KOP #	Viewer Name	Viewer Type	Distance to Project	Viewer Position	Level of Visual Contrast[(a)]	Magnitude of Impact			Impact Description
						County Well Road Siting Area	Sellards Road Siting Area	Bofer Canyon Siting Area	
1	McNary NWR	Recreation	Not visible	Inferior	Slight	Negligible	Negligible	Negligible	Project elements associated with the three solar siting areas would not be visually evident.
2	S Clodfelter Road – East, Central, and West	Residential	Not visible	Inferior	Slight	Negligible	Negligible	Negligible	Project elements associated with the three solar siting areas would not be visually evident.
3	Chandler Butte	Recreation	2.1 miles	Superior	Moderate	Medium	Negligible	Negligible	Views of the County Well Road option would be unobstructed with the Project being prominent and beginning to dominate views from this area. The contrast between the dark solar arrays and the tan grasses would be evident from this elevated viewing area, approximately 2 miles away, resulting in medium, long-term impacts on views.
4	I-82 South	Travel route	6.0 miles	Level	Moderate	Negligible	Negligible	Medium	The Bofer Canyon option would be prominent in view and modify the existing landscape through the introduction of dark, geometric solar arrays in a rolling landscape comprised of golden, tan grasses. The impacts on these views would incrementally increase as motorists drive I-82 between this location and KOP 6 (approximately 10 miles), with some views of the solar arrays being intermittently screened by topography. From this location, the Project would result in medium, long-term impacts on views.
5	Badger Mountain	Recreation	Not visible	Level	Slight	Negligible	Negligible	Negligible	Project elements associated with the three solar siting areas would not be visually evident.

KOP #	Viewer Name	Viewer Type	Distance to Project	Viewer Position	Level of Visual Contrast[(a)]	Magnitude of Impact			Impact Description
						County Well Road Siting Area	Sellards Road Siting Area	Bofer Canyon Siting Area	
6	Bofer Canyon Road/I-82	Travel route	0.6 mile	Level	Strong	Negligible	Negligible	High	The Bofer Canyon option would be visually dominant and demand attention within the setting as solar arrays would be located on both sides of the interstate. An existing transmission line has modified the existing landscape, including the introduction of strong vertical lines. The contrast between the dark solar arrays and the tan grasses would be highly evident. In consideration of the existing modifications in view, the Project would result in medium, long-term impacts on views from this location. These impacts would continue to increase as viewers would pass the existing transmission line into an area where views of the proposed solar arrays would be highly prominent as viewed both to the east and west resulting in high, long-term local impacts.
7	Highway 221	Travel route, residential	3.1 miles	Level	Weak	Low	Low	Negligible	The County Well Road and Sellards Road options would begin to attract attention but would be visually subordinate in the setting. The low form of the solar arrays would blend with the existing landscape from this distance (approximately 3–4 miles) and would be partially screened by topography and existing structures. The Project would result in low, long-term impacts on views.
8	Kennewick (Canyon Lakes Area) – South and West	Residential	5.9 miles	Inferior	Slight	Negligible	Negligible	Negligible	Project elements associated with the three solar siting areas would not be visually evident.
9	Benton City	Residential, travel route, commercial	3.9 miles	Inferior	Slight	Negligible	Negligible	Negligible	Project elements associated with the three solar siting areas would not be visually evident.
10	Badger Road	Residential, travel route	6.4 miles	Inferior	Slight	Negligible	Negligible	Negligible	Project elements associated with the three solar siting areas would not be visually evident.
11	Highland/ Finley Area	Residential	8.5 miles	Inferior	Slight	Negligible	Negligible	Negligible	Project elements associated with the three solar siting areas would not be visually evident.

KOP #	Viewer Name	Viewer Type	Distance to Project	Viewer Position	Level of Visual Contrast[a]	Magnitude of Impact			Impact Description
						County Well Road Siting Area	Sellards Road Siting Area	Bofer Canyon Siting Area	
12	County Well Road[b]	Residential, travel route	0.2 mile	Level	Strong	High	Negligible	Negligible	The County Well Road Option would be prominent in view and modify the existing landscape through the introduction of dark, geometric solar arrays in a flat to rolling landscape comprised of tan-colored agricultural fields. An existing transmission line has already modified the landscape, including the introduction of strong vertical lines and geometric forms. In consideration of the existing modifications in view, the Project would result in medium, long-term impacts on views from this location. These impacts would continue to increase as viewers would pass the existing transmission line into an area where views of the proposed solar arrays would be highly prominent resulting in high, long-term local impacts.
13	Travis Road South of Sellards Road	Residential, travel route	1.0 mile	Level	Moderate	Negligible	Medium	Negligible	The Sellards Road Option would be prominent in view and modify the existing landscape through the introduction of dark, geometric solar arrays in a rolling landscape comprised tan-colored agricultural fields (note: visual simulation in Attachment B does not include these views to the west). The views from this area are generally intact, with views of the Project occurring away from the direction of travel along the road. Views of the Project would therefore be short in duration. In consideration of view duration and partial screening by existing topography, the Project would result in medium, long-term impacts on views from this location.
N/A	Horse Heaven Hills Recreation Area	Recreation	Not visible	Inferior	Slight	Negligible	Negligible	Negligible	Project elements associated with the three solar siting areas would not be visually evident.

[a] Level of visual contrast indicated here refers to the solar siting area(s) where a low, medium, or high magnitude of impact was identified in subsequent columns. For alternatives where a "negligible" magnitude of impacts was identified, the proposed solar arrays would not be readily seen from those KOP locations.

[b] Views from dispersed residences within the foreground distance zone (0–0.5 mile) were analyzed from KOP 12.

4.2.2.4 SUBSTATIONS

The proposed substations would introduce a flat, rectangular, geometric form associated with the substation yard and tall, vertical, and geometrical substation equipment. These industrial features would contrast with the existing rolling agrarian landscape character. Where located adjacent to existing transmission lines or substations, the proposed elements would be in scale and consistent with the landscape setting, but in areas where there are limited existing utilities, the proposed substations would alter the landscape setting and would be visually prominent.

In general, the proposed substations would not attract attention from most locations within the area of analysis. The introduction of the proposed substations into views from KOPs 6 and 12, which have been modified by an existing transmission line, would result in long-term, medium impacts on views from 1.2 miles and 0.5 mile away respectively. The geometric form of the proposed substation yard and vertical structures would attract attention but would be co-dominant with the existing modifications in the landscape. Views from KOPs 3, 4, and 7 would be minimally modified by the proposed substations as views would occur from approximately 2.7 to 7.3 miles away, where the Project would mostly blend with the existing setting. The geometric form of the substation and vertical protrusions would appear in scale with the existing landscape from these more distant viewpoints.

The proposed substations would not be visible from KOPs 1, 2, 5, 8, 9, 10, 11, 13, and the Horse Heaven Hills Recreation Area, therefore no impacts from this Project component would occur on these views.

The proposed transmission lines would modify the existing landscape character through the introduction of repeating vertical transmission line structures, associated linear access roads, and associated vegetation clearing. These effects would be most apparent where there are no adjacent existing transmission lines or other vertical protrusions (e.g., communication towers, substations, etc.), and would result in long-term impacts on landscape character.

Impacts to viewers from proposed transmission lines would vary from high to low. The highest impacts would occur on the views from three KOP locations (KOPs 6, 12, and 13) located within 2 miles of the proposed transmissions lines. Views from KOP 6 have been modified by an existing transmission line, with the introduction of the proposed transmission line resulting in medium, long-term impacts from approximately 1.2 miles away. The form of the existing transmission line would be repeated by the Project (H-frame structures), reducing potential landscape clutter, and would be sited further away than the existing transmission line. Therefore, the Project would attract attention but would be co-dominant with the existing modifications.

The proposed transmission facilities would begin to dominate views from KOP 12, where an existing transmission line crosses the road, and the Project parallels the road with a series of transmission line structures stretching to the horizon. Due to the head-on view of the proposed transmission line and its difference in design compared to the existing line, the Project would result in medium, long-term impacts from this location. Views from KOP 13 would be highly impacted by the proposed transmission line. From this location, there are limited existing modifications in view, with the existing landscape setting appearing mostly intact. The Project would dominate these unobstructed views through the introduction of tall transmission line structures viewed as skylined above the low, rolling terrain.

The proposed transmission lines would not be visible from KOPs 1, 5, and the Horse Heaven Hills Recreation Area, therefore no impacts from this Project component would occur on these views. Impacts to views from all other KOPs would be low.

In summary, during operation the substations and transmission lines would result in areas of high, long-term, unavoidable, local impacts as well as areas of medium, long-term, unavoidable, regional impacts on visual resources.

4.2.2.5 BATTERY ENERGY STORAGE SYSTEMS

Each proposed BESS would introduce a flat, rectangular, geometric form associated with its proposed yard, similar to the proposed substations, with equipment contained in geometric shipping containers (stacked up to 40 feet tall). These proposed features would contrast with the existing rolling agrarian landscape character.

In general, the proposed BESSs would not attract attention from most locations within the area of analysis. The introduction of the proposed BESSs into views from KOPs 6 and 12, which have already been modified by an existing transmission line, would result in long-term, medium impacts on views from 1.2 miles and 0.5 mile away respectively. The geometric form of the proposed BESSs, including the vertically stacked rectangular containers, would attract attention but would be co-dominant with the existing modifications. Views from KOPs 3, 4, and 7 would be minimally modified by the BESSs as views would occur from approximately 2.7 to 7.3 miles away, where the Project would mostly blend with the existing landscape setting. The geometric form of the BESSs from these three KOPs would appear in scale with the existing landscape from these more distant viewpoints.

The proposed BESSs would not be visible from KOPs 1, 2, 5, 8, 9, 10, 11, 13, and the Horse Heaven Hills Recreation Area, therefore no impacts from these Project components would occur on these views. Overall, activities during operation of the BESSs would result in medium, long-term, unavoidable, local impacts on visual resources.

4.2.2.6 COMBINED IMPACTS OF COMPONENTS

The combined impacts of the different Project components would result in a landscape character dominated by large-scale energy infrastructure, including wind turbines, solar arrays, collector lines, access roads, multiple transmission lines and substations, the O&M facility, and the BESS. The existing setting does include a smaller wind farm and two existing transmission lines, but the scale of the Project and prominence of the proposed turbines would result in high, long-term impacts to the existing landscape.

Views from most residences and other KOP locations would primarily be impacted by the presence of the large, moving proposed wind turbines. The turbines would attract attention and depending on the extent of their viewshed modified by the turbines, could dominate views as described in Tables 4 and 5. In addition, some viewers, such as those associated with KOPs 3, 6, 12 and 13, would have views of multiple Project components, introducing additional variety and visual clutter into these views as shown in the visual simulations (see Attachment B). Views from these locations would be dominated by energy infrastructure as a result of the additive effects from each Project component, resulting in high, long-term impacts on these views. Since these impacts occur on viewpoints beyond the neighboring receptors, these effects would be regional in extent. In summary, activities during operation of all components of the Project would result in high, long-term, unavoidable, regional impacts on visual resources.

In consideration of the CESA methods and the EFSEC process, the Project was assessed as it relates to compliance with state and local visual management requirements. The Project analysis contained in this report would meet WAC 463-60-362(3), which establishes the requirements for a visual resource analysis to meet the EFSEC process. Specifically, the analysis describes the aesthetic impacts of the proposed Project, shows its location relative to physical features of the site, and outlines procedures to restore or enhance the landscape disturbed during construction (see Section 4.2.4 of this report for proposed mitigation measures, the Applicant's ASC including the Revegetation and Noxious Weed Management Plan and Initial Site Restoration Plan).

The 2020 Benton County Comprehensive Plan identified a planning goal to conserve the visually prominent naturally vegetated steep slopes and elevated ridges that define the Columbia Basin landscape, which are uniquely a product of ice age floods. The planning policy further states that the County should "consider the preservation of the ridges and hillside areas through various development regulations" (Benton County 2021). Since these lands have not been placed into Open Space Conservation, or other types of conservation, and there are no specific policies to protect the landscapes impacted by the Project, the Project would technically be in compliance with this aspect of the county plan. The Horse Heaven Hills and northern ridgeline would, however, become dominated by energy infrastructure, with potential long duration views from areas within the communities between Benton City and Kennewick. These impacts on views would be most intense where unobstructed views of a large number of turbines occur.

4.2.3 Impacts during Decommissioning

The decommissioning and removal of the Project and its components would have similar impacts as the construction process. The option to repower the Project with new models of wind turbines and solar arrays would also have impacts similar to the construction process but would not result in long-term decommissioning and reclamation of the site. Repowering of the facility is not analyzed further in this report.

The decommissioning process would result in increased motion associated with construction equipment, short-term impacts from dust generation, and landform modification to more closely match preconstruction conditions. The removal of Project components would likely require additional ground disturbance and vegetation clearing, resulting in reclamation efforts similar to those conducted after the construction process was completed. The restoration of vegetation in these areas would take a number of years to fully establish, but over time the landscape impacted by the Project would begin to more closely resemble preconstruction conditions.

4.2.3.1 TURBINE OPTION 1

Impacts would be similar to the construction of the Project including the movement of vehicles attracting attention during decommissioning activities. Viewers located within the foreground distance zone (0–0.5 mile) or in locations where views would be occupied by large portions of the Project being decommissioned, would result in increased visual contrast on these views. These impacts would be short in duration and would cease after removal of the Project is complete and vegetation has been reestablished. Decommissioning activities for Turbine Option 1 would result in medium, short-term, probable, local impacts on visual resources.

4.2.3.2 TURBINE OPTION 2

Impacts would be similar to Turbine Option 1 except there are fewer proposed wind turbines, requiring fewer roads and other supporting facilities to be removed. This would result in slightly reduced visual contrast and modifications to the existing landscape introduced during Project decommissioning. Decommissioning activities for Turbine Option 2 would result in medium, short-term, probable, local impacts on visual resources.

4.2.3.3 SOLAR ARRAYS

Impacts would be similar to the construction of the Project, which would be focused within the selected solar siting areas. Within the fenced boundaries, all lands would be restored to more closely match preconstruction conditions, including revegetation of the site. Decommissioning activities for the solar arrays would result in low, short-term, probable, local impacts on visual resources.

4.2.3.4 SUBSTATIONS

Impacts would be similar to the construction of the Project for both the proposed substations and transmission lines. The removal of the tall, vertical structures associated with both components would result in additional motion from construction equipment, structure deconstruction, and conductor removal. As described for other components, vegetation restoration would occur in these disturbed areas, and the landscape would begin to more closely resemble preconstruction conditions. Decommissioning activities for the substations and transmission lines would result in low, short-term, probable, local impacts on visual resources.

4.2.3.5 BATTERY ENERGY STORAGE SYSTEMS

Impacts would be similar to the construction of the Project with the removal of the BESS containers and reclamation of those sites. This would include additional motion from construction equipment and associated dust during those activities. As described for other components, vegetation restoration would occur in these disturbed areas, and the landscape would begin to more closely resemble preconstruction conditions. Decommissioning activities for the BESSs would result in low, short-term, probable, local impacts on visual resources.

4.2.3.6 COMBINED IMPACTS OF COMPONENTS

During Project decommissioning, there would be short-term impacts from these activities, which would occupy a large portion of the landscape and include removal of wind turbines, solar arrays, the O&M facility, transmission lines, BESSs, and substations, as well as the reclamation of access roads, turbine pads, and other areas disturbed during construction and operation of the Project. These activities would include views of additional vehicular traffic as well as areas of exposed soil after the removal of vegetation and during earthwork activities, prior to site reclamation efforts. The removal of vegetation would be noticeable in the setting and contrast with the existing character; however, over time, as vegetation is re-established in the area, it would begin to repeat vegetation patterns common in the area.

Viewpoints and KOPs located within the foreground distance zone (0–0.5 mile) would be most impacted by decommissioning, particularly where a large portion of their viewshed would be occupied by decommissioning multiple Project components simultaneously. Overall, activities during decommissioning of all components of the Project would result in medium, short-term, probable, regional impacts on visual resources.

4.2.4 Mitigation Measures

4.2.4.1 APPLICANT COMMITTED

To reduce impacts on landscape character and views and to strive to minimize any incompatibility with state and local visual management requirements, the Applicant has developed a series of BMPs and other mitigation measures as part of the Project ASC. Many of these BMPs, as well as the design of the Project, incorporated mitigation measures outlined in the BLM's *Best Management Practices for Reducing Visual Impacts of Renewable Energy Facilities on BLM-Administered Lands* (BLM 2013) and CESA's visual impact assessment process (CESA 2011), including (but not limited to)

- Considering topography when siting wind turbines including less rigid turbine configurations in rolling terrain responding to local topography;
- Clustering or grouping turbines to break up long lines of turbines;

- Striving to create visual order and unity among turbine clusters;
- Maintaining operational turbines and other Project components;
- Preparing an effective decommissioning plan; and
- Selecting appropriate paint and finish selection to match the existing setting.

The Project also considered two different turbine options as part of the assessment of impacts to compare one design with more, smaller turbines (Option 1) to a design with fewer, taller turbines (Option 2). Due to the siting and operating requirements for wind turbines, there are limited mitigation measures that would considerably reduce impacts on visual resources, beyond downsizing the Project to reduce the number of turbines in view. The use of the following Applicant-committed mitigation in the Project design, construction, operation, and decommissioning stages would both directly and indirectly reduce impacts on visual resources:

- Active dust suppression will be implemented during construction.
- Following completion of construction, temporarily disturbed areas (e.g., laydown yards, crane paths not used as Project access roads) will be returned to their previous conditions once construction is complete.
- Restoration of the laydown yards will involve preconstruction stripping and storing topsoil (including weed avoidance), removing the gravel surface, regrading to preconstruction contours, restoring topsoil and de-compacting subsoils as needed, and reseeding with approved seed mixes.
- Following completion of construction, the temporary crane paths will be removed and the area restored in accordance with the Project's Revegetation and Noxious Weed Management Plan.
- The Applicant will provide a clean-looking facility free of debris and unused or broken-down equipment by storing equipment and supplies in designated areas within the O&M facilities and promptly removing damaged or unusable equipment from the site.
- The turbines and solar arrays will be uniform in design to present a trim, uncluttered, aesthetically attractive appearance.
- The Applicant will construct support facilities with non-reflective materials in muted tones and will use white or light gray, non-reflective paint to minimize the need for daytime aviation lighting and eliminate glare from the turbines.

4.2.4.2 RECOMMENDED MITIGATION MEASURES

To further reduce impacts on visual resources, this report includes additional recommended mitigation measures adapted from the BLM (2013) and CESA (2011).

- **Wind turbines**
  - Relocate turbines located within the foreground distance zone (0–0.5 mile) of residences (BLM 2013; CESA 2011).
  - No piggyback advertising, cell antennas, commercial messages, or symbols placed on proposed wind turbines (BLM 2013).
  - Maintain clean nacelles and towers to avoid any spilled or leaking fluids accumulating dirt, contrasting with the clean, white/gray wind turbine (BLM 2013).
- **Solar arrays**
  - Use color-treated solar collectors and support structures to minimize color contrast with the existing landscape (BLM 2013).

- Avoid complete removal of vegetation beneath solar arrays, where possible, to reduce contrast between the exposed soil and adjacent undisturbed areas (BLM 2013).

- **Substation and transmission lines**
  - Maximize the span length across highways, and other linear viewing locations, to reduce visual contrast at the highway crossings, moving the structures as far from the road as possible (BLM 2013).
  - Choose the type of proposed transmission structure (H-frame or monopole) to best match the adjacent transmission lines, minimizing clutter and visual contrast introduced into the landscape (BLM 2013).

Application of these mitigation measures would incrementally lessen visual contrast but based on the scale of the Project, including the height of the proposed wind turbines, these measured would not effectively reduce identified levels of contrast or degrees of impact magnitude.

4.3 Impacts of No Action Alternative

Under the No Action Alternative, impacts related to visual resources from the construction, operation, and decommissioning of the Proposed Action would not occur. Although the Proposed Action would not occur, other renewable energy projects may be constructed within the visual area of analysis. These projects could lead to development of a wind and/or solar facility within the Project's Lease Boundary, which could result in impacts similar to those described herein for construction, operation, and decommissioning of the Proposed Action. However, for the purpose of this analysis, it is assumed that no future development would occur within the Lease Boundary, and therefore, impacts on visual resources would not occur.

5 LITERATURE CITED

Benton County. 2021. Updated Comprehensive Plan. Adopted February 2018, last updated June 8, 2021. Available at: https://www.co.benton.wa.us/files/documents/2017CompPlanUpdate-datedJune821withoutappealedtextlang129053554010422PM.pdf. Accessed February 8, 2022.

Bureau of Land Management (BLM). 1986. *Visual Resource Contrast Rating*. BLM Manual 8431. Available at: https://blmwyomingvisual.anl.gov/docs/BLM_VCR_8431.pdf. Accessed February 8, 2022.

BLM. 2013. *Best Management Practices for Reducing Visual Impacts of Renewable Energy Facilities on BLM-Administered Lands*. BLM Wyoming State Office, Cheyenne. Available at: https://blmwyomingvisual.anl.gov/docs/BLM_RenewableEnergyVisualBMPs_LowRes.pdf. Accessed February 8, 2022.

BLM. 2022. Horse Heaven Hills Recreation Map. Available at: https://www.blm.gov/sites/blm.gov/files/orwa-horse-heaven-hills-map.pdf. Accessed February 8, 2022.

Clean Energy States Alliance (CESA). 2011. *A Visual Impact Assessment Process for Wind Energy Projects*. Available at: https://www.cesa.org/assets/2011-Files/States-Advancing-Wind-2/CESA-Visual-Impacts-Methodology-May2011.pdf. Accessed February 8, 2022.

Horse Heaven Wind Farm, LLC. 2021a. Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Washington Energy Facility Site Evaluation Council Application for Site Certification EFSEC Docket Number: EF-210011.

Horse Heaven Wind Farm, LLC. 2021b. *Aesthetics Technical Memorandum for the Horse Heaven Wind Farm Project*. October 2021.

National Park Service. 2014. Ice Age Floods National Geologic Trail Foundation Statement. Available at: https://www.nps.gov/iafl/learn/management/upload/IAFL_FD_2014-508s.pdf. Accessed February 8, 2022.

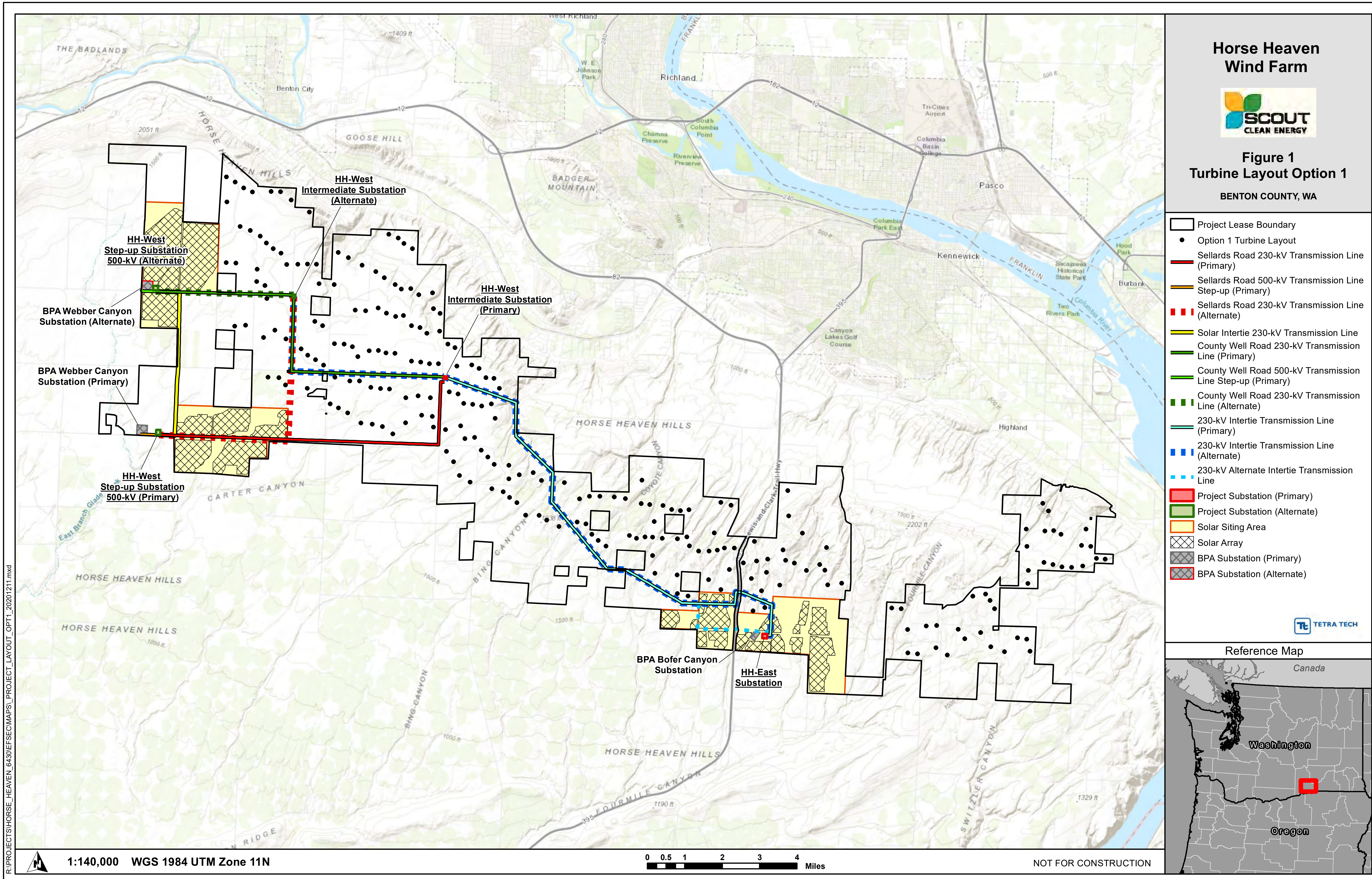
Sullivan, R. G., L. B. Kirchler, T. Lahti, S. Roché, K. Beckman, B. Cantwell, and P. Richmond. 2012. *Wind Turbine Visibility and Visual Impact Threshold Distances in Western Landscapes*. Available at: https://blmwyomingvisual.anl.gov/docs/WindVITD.pdf. Accessed February 8, 2022.

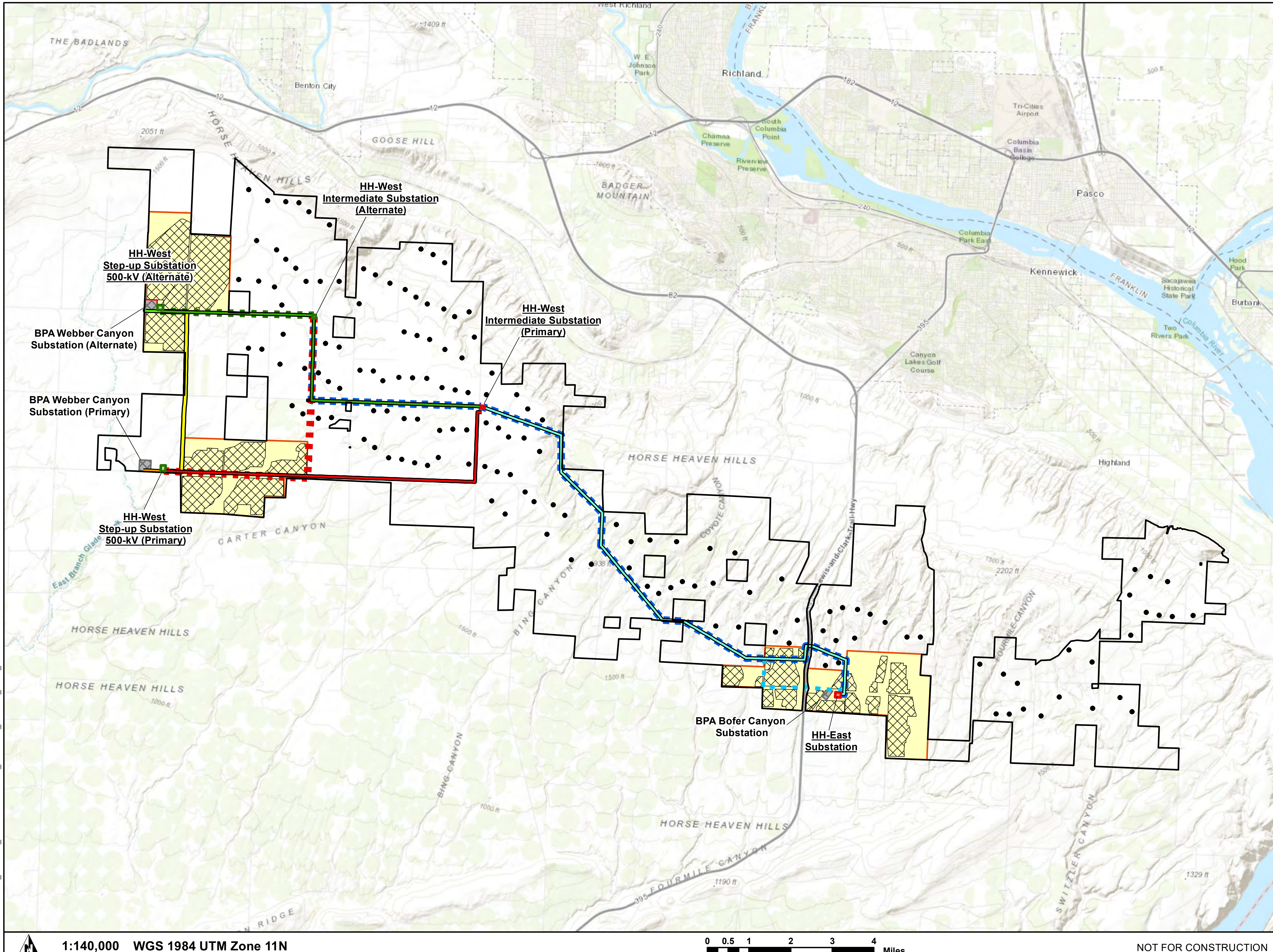
U.S. Environmental Protection Agency (EPA). 2010. Level III and IV Ecoregions of Washington. Available at: https://gaftp.epa.gov/EPADataCommons/ORD/Ecoregions/wa/wa_eco.pdf. Accessed February 8, 2022.

This page intentionally left blank.

ATTACHMENT A

Maps


Horse Heaven Wind Farm
SCOUT CLEAN ENERGY
Figure 1
Turbine Layout Option 1
BENTON COUNTY, WA
Project Lease Boundary
Option 1 Turbine Layout
Sellards Road 230-kV Transmission Line (Primary)
Sellards Road 500-kV Transmission Line Step-up (Primary)
Sellards Road 230-kV Transmission Line (Alternate)
Solar Intertie 230-kV Transmission Line
County Well Road 230-kV Transmission Line (Primary)
County Well Road 500-kV Transmission Line Step-up (Primary)
County Well Road 230-kV Transmission Line (Alternate)
230-kV Intertie Transmission Line (Primary)
230-kV Intertie Transmission Line (Alternate)
230-kV Alternate Intertie Transmission Line
Project Substation (Primary)
Project Substation (Alternate)
Solar Siting Area
Solar Array
BPA Substation (Primary)
BPA Substation (Alternate)
TETRA TECH
Reference Map
Canada
Washington
Oregon
HH-West Intermediate Substation (Alternate)
HH-West Step-up Substation 500-kV (Alternate)
BPA Webber Canyon Substation (Alternate)
HH-West Intermediate Substation (Primary)
BPA Webber Canyon Substation (Primary)
HH-West Step-up Substation 500-kV (Primary)
BPA Bofer Canyon Substation
HH-East Substation
THE BADLANDS
Benton City
GOOSE HILL
BADGER MOUNTAIN
Richland
Pasco
Kennewick
HORSE HEAVEN HILLS
CARTER CANYON
BING CANYON
COYOTE CANYON
FOURMILE CANYON
SWITZLER CANYON
Highland
Burbank
1:140,000 WGS 1984 UTM Zone 11N
0 0.5 1 2 3 4 Miles
NOT FOR CONSTRUCTION
R:\PROJECTS\HORSE_HEAVEN_6430\EFSEC\MAPS_PROJECT_LAYOUT_OPT1_20201211.mxd



Horse Heaven Wind Farm

SCOUT CLEAN ENERGY

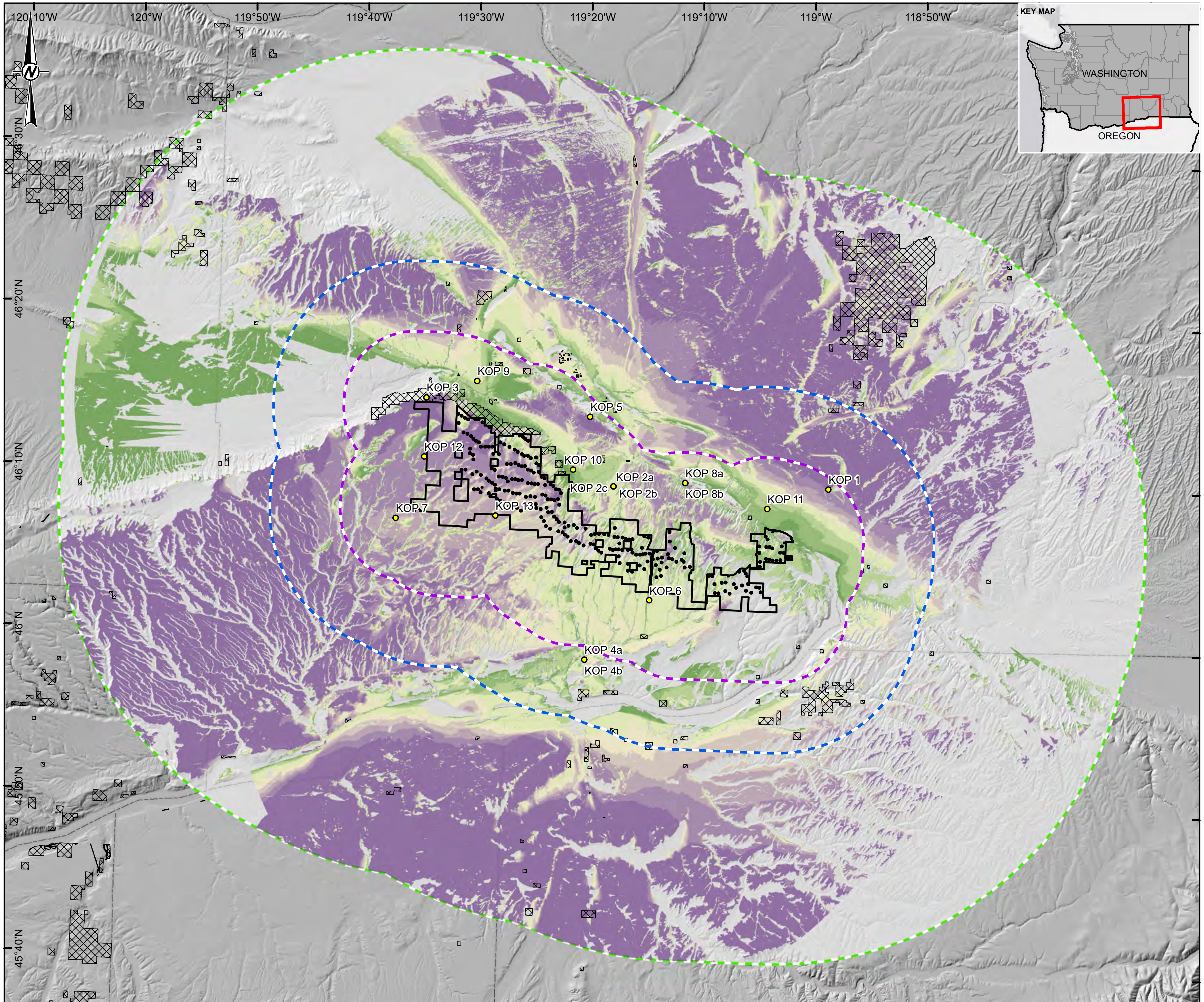
Figure 2
Turbine Layout Option 2

BENTON COUNTY, WA

- Project Lease Boundary
- Option 2 Turbine Layout
- Sellards Road 230-kV Transmission Line (Primary)
- Sellards Road 500-kV Transmission Line Step-up (Primary)
- Sellards Road 230-kV Transmission Line (Alternate)
- Solar Intertie 230-kV Transmission Line
- County Well Road 230-kV Transmission Line (Primary)
- County Well Road 500-kV Transmission Line Step-up (Primary)
- County Well Road 230-kV Transmission Line (Alternate)
- 230-kV Intertie Transmission Line (Primary)
- 230-kV Intertie Transmission Line (Alternate)
- 230-kV Alternate Intertie Transmission Line
- Project Substation (Primary)
- Project Substation (Alternate)
- Solar Siting Area
- Solar Array
- BPA Substation (Primary)
- BPA Substation (Alternate)

TETRA TECH

Reference Map



NOTE(S)

1.

REFERENCE(S)

1. PROJECT FEATURES PROVIDED BY EFSEC, NOV 2021
2. SERVICE LAYER CREDITS:

CLIENT

State of Washington Energy Facility Site Evaluation Council

PROJECT

Horse Heaven Wind Farm

TITLE

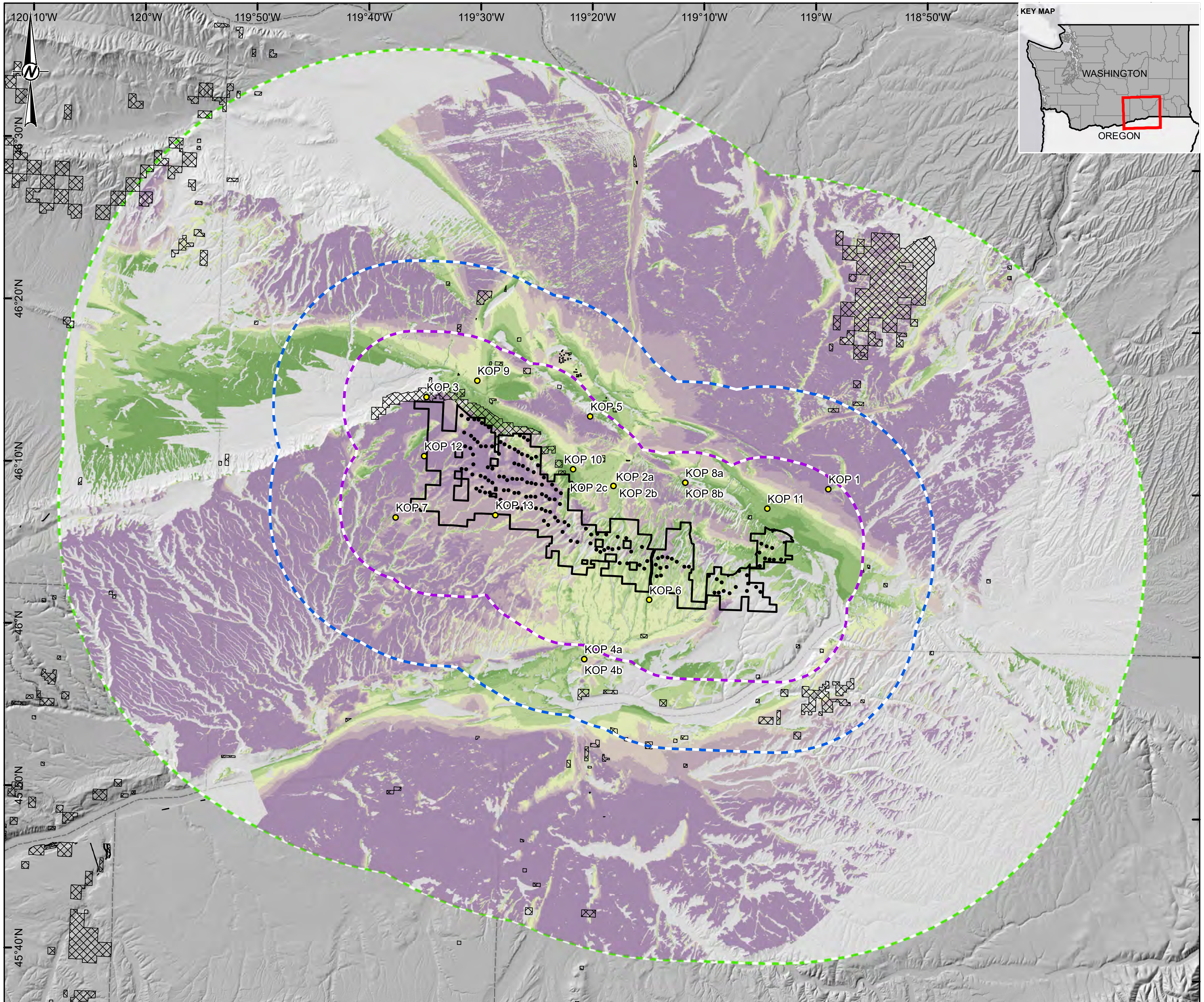
Viewshed Analysis Results:
Turbine Layout Option 1

CONSULTANT

GOLDER
MEMBER OF WSP

YYYY-MM-DD	2022-02-15
DESIGNED	HJ
PREPARED	HJ
REVIEWED	KW
APPROVED	####

PROJECT NO.	CONTROL	REV.	FIGURE
20450841	2000	A	3



LEGEND

- Proposed Turbine Location (150 Turbines modeled at 671' blade-tip height)
- Viewpoint Location
- Project Lease Boundary
- 10 mile Buffer
- 5 mile Buffer
- 25 mile Buffer
- BLM Land

Number of Turbines Potentially Visible

- 0
- 1 - 10
- 11 - 25
- 26 - 50
- 50 - 75
- 76 - 100
- 101 - 125
- 126 - 150

0 5 10
MILES

NOTE(S)

1.

REFERENCE(S)

1. PROJECT FEATURES PROVIDED BY EFSEC, NOV 2021
2. SERVICE LAYER CREDITS:

CLIENT
State of Washington Energy Facility Site Evaluation Council

PROJECT
Horse Heaven Wind Farm

TITLE
Viewshed Analysis Results:
Turbine Layout Option 2

CONSULTANT
GOLDER MEMBER OF WSP

YYYY-MM-DD	2022-02-15
DESIGNED	HJ
PREPARED	HJ
REVIEWED	KW
APPROVED	####

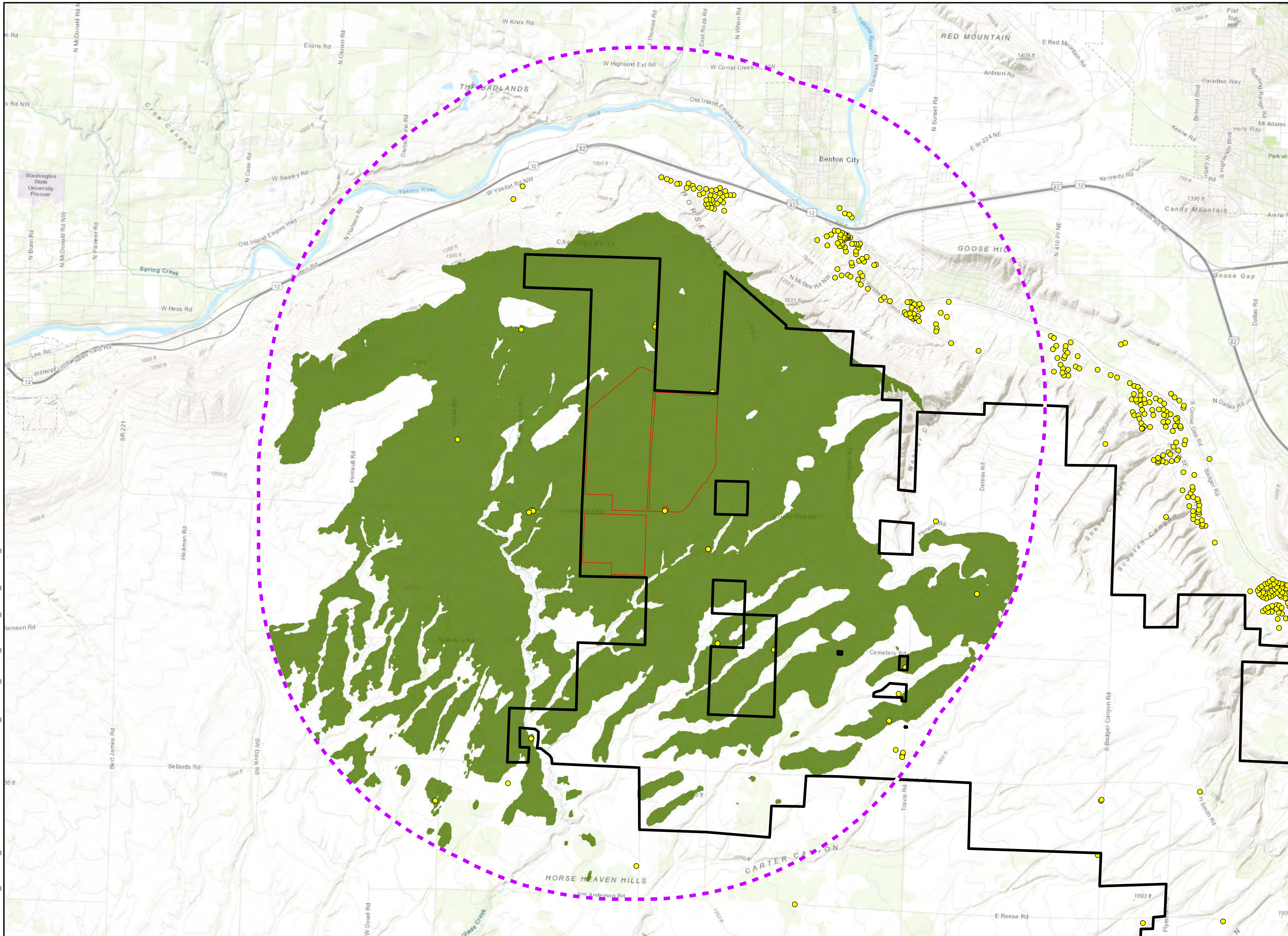
PROJECT NO.	CONTROL	REV.	FIGURE
20450841	2000	A	4

Horse Heaven Wind Farm

SCOUT CLEAN ENERGY

Figure 5
Viewshed Analysis Results: Western Solar Array (County Well Road)

BENTON COUNTY, WA



- Visual Receptor
- Solar Array Fence Line
- Project Lease Boundary
- Solar Array 5-mile Buffer
- Potentially Visible
- Not Visible

TETRA TECH

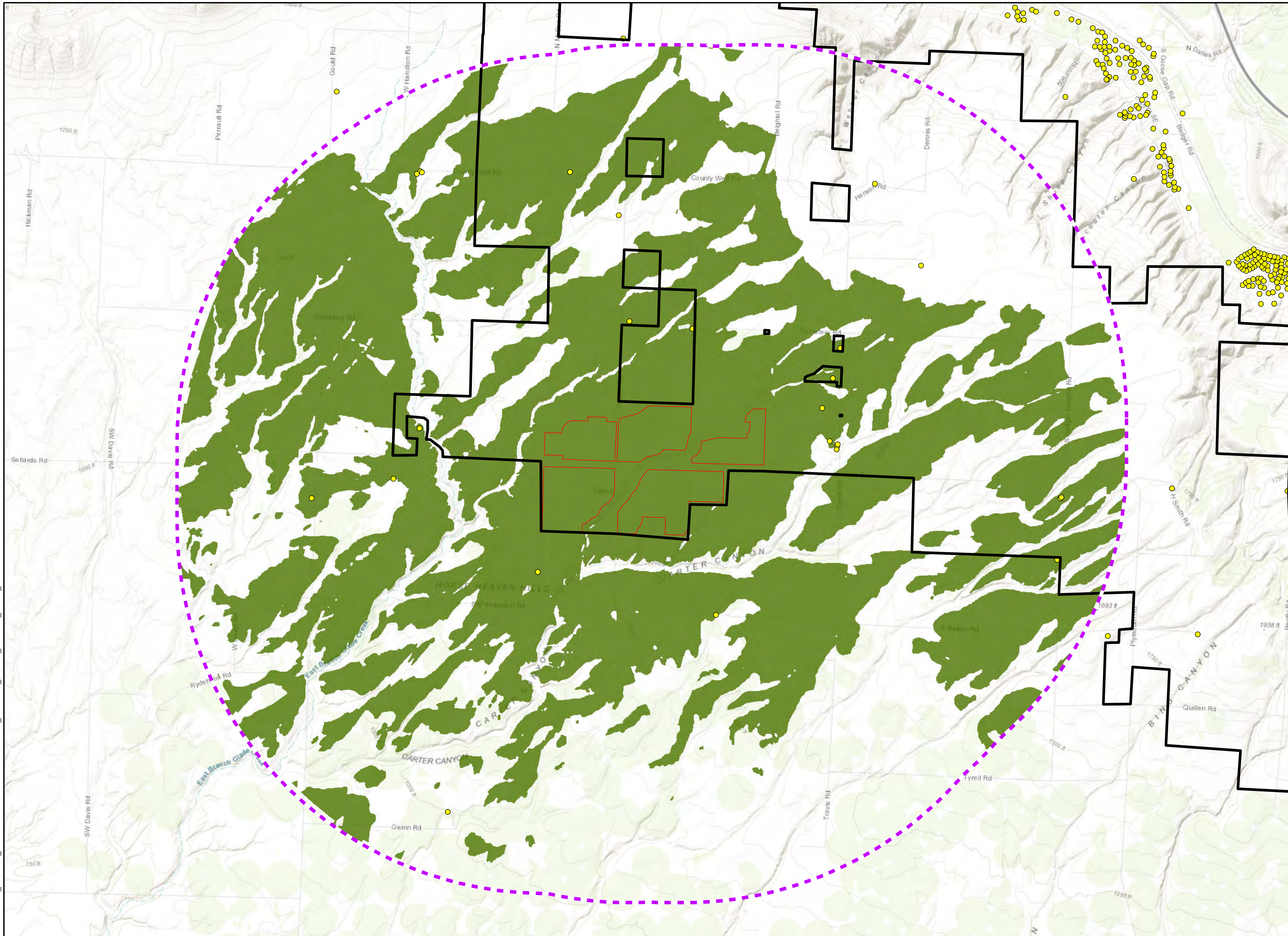
Reference Map

1:90,000 WGS 1984 UTM Zone 11N

0 0.5 1 2 3 4 Miles

NOT FOR CONSTRUCTION

R:\PROJECTS\HORSE_HEAVEN_6430\VIEWSHED\MAPS\VIEWSHED_20201120_SOLAR_ARRAYS_WEST_COUNTY_WELL.mxd



Horse Heaven Wind Farm

SCOUT CLEAN ENERGY

Figure 6
Viewshed Analysis Results: Western Solar Array (Sellards Road)

BENTON COUNTY, WA

- Visual Receptor
- Solar Array Fence Line
- Project Lease Boundary
- Solar Array 5-mile Buffer
- Potentially Visible
- Not Visible

TETRA TECH

Reference Map

1:80,000 WGS 1984 UTM Zone 11N

0 0.5 1 2 3 4 Miles

NOT FOR CONSTRUCTION

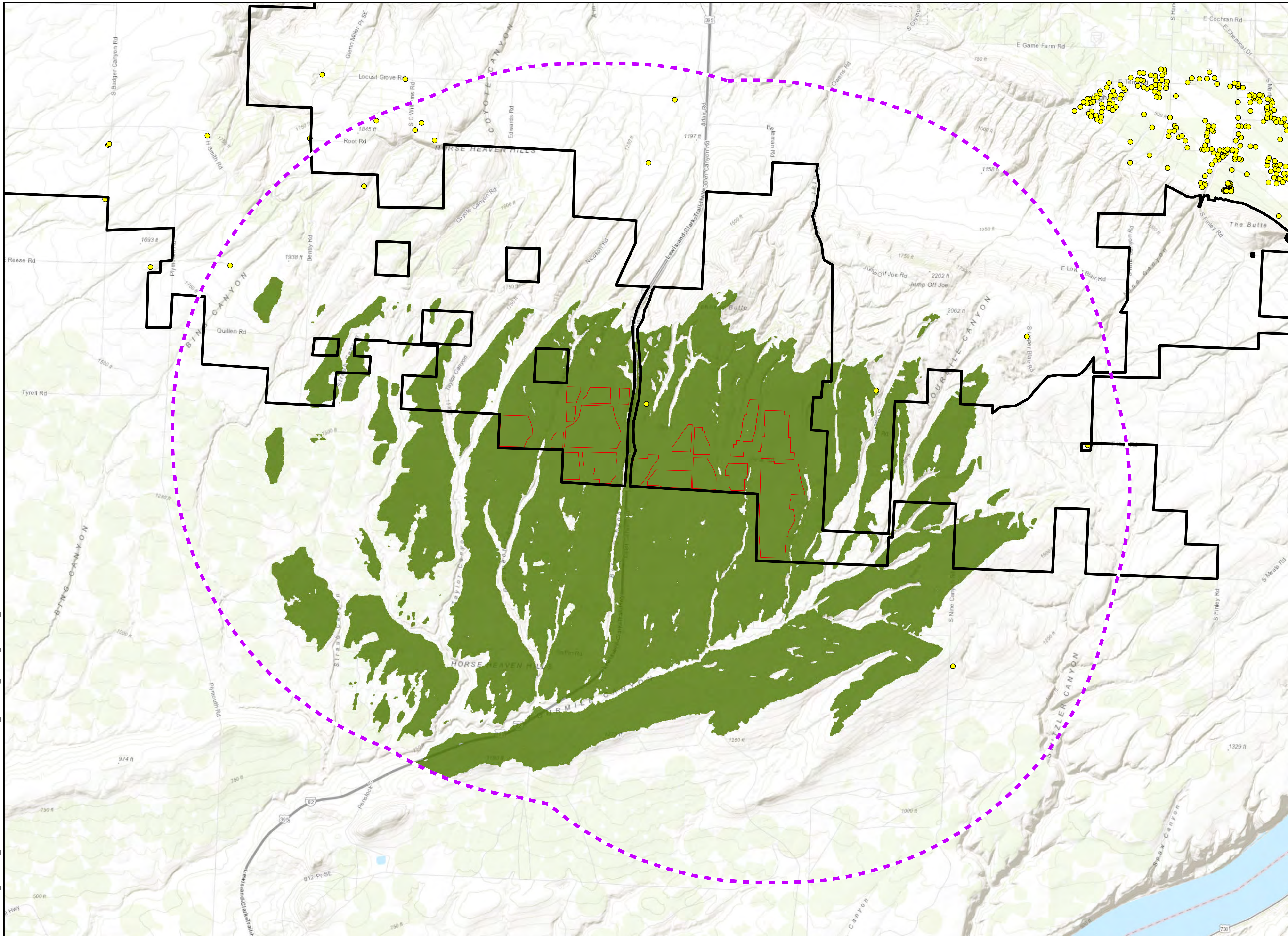
R:\PROJECTS\HORSE_HEAVEN_6430\VIEWSHED\MAPS\VIEWSHED_20201120_SOLAR_ARRAYS_WEST_SELLARDS.mxd

Horse Heaven Wind Farm

SCOUT CLEAN ENERGY

Figure 7
Viewshed Analysis Results: Eastern Solar Array (Bofer Canyon)

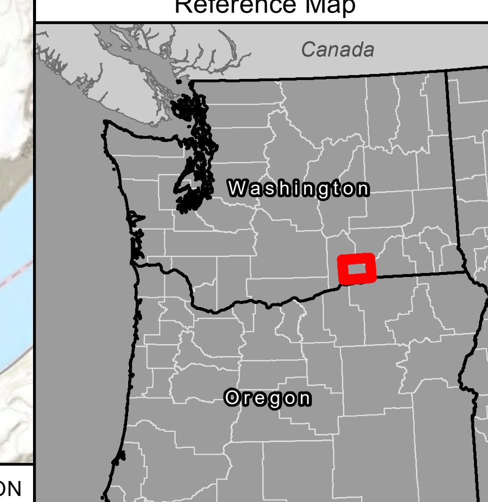
BENTON COUNTY, WA



- Visual Receptor
- Solar Array Fence Line
- Project Lease Boundary
- Solar Array 5-mile Buffer
- Potentially Visible
- Not Visible

TETRA TECH

Reference Map



1:90,000 WGS 1984 UTM Zone 11N

0 0.5 1 2 3 4 Miles

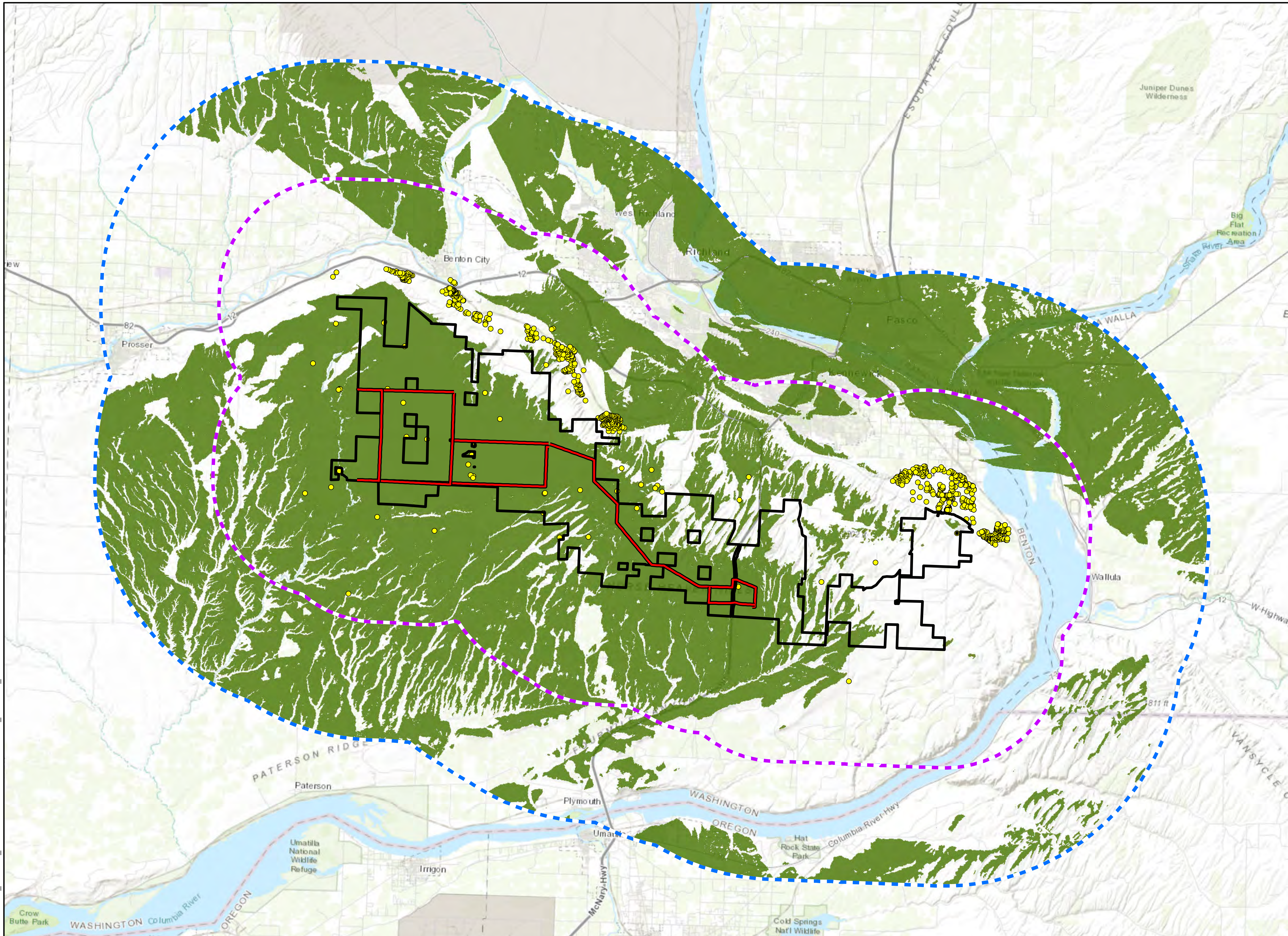
NOT FOR CONSTRUCTION

R:\PROJECTS\HORSE_HEAVEN_6430\VIEWSHED\MAPS\VIEWSHED_20201120_SOLAR_ARRAYS_EASTERN.mxd

Horse Heaven Wind Farm

Figure 8
Viewshed Analysis Results: Proposed Transmission Lines

BENTON COUNTY, WA



- Proposed Transmission Line
- Visual Receptor
- Project Lease Boundary
- 5-mile Buffer
- 10-mile Buffer
- Potentially Visible
- Not Visible

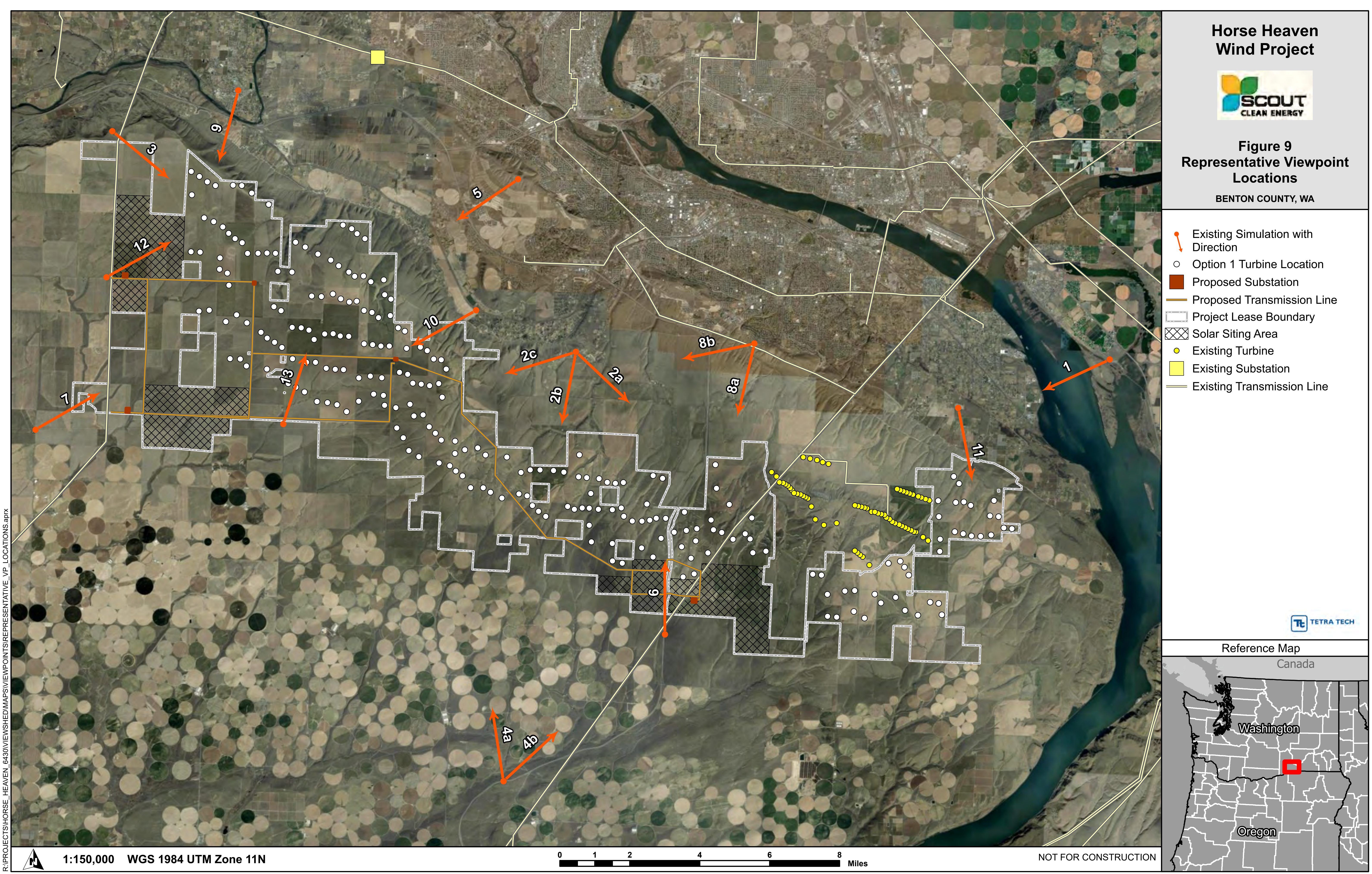
Reference Map

1:250,000 WGS 1984 UTM Zone 11N

0 2 4 8 12 16 Miles

NOT FOR CONSTRUCTION

R:\PROJECTS\HORSE_HEAVEN_6430\VIEWSHED\MAPS\VIEWSHED_20201120_TLINES.mxd


Horse Heaven Wind Project
SCOUT CLEAN ENERGY
Figure 9
Representative Viewpoint Locations
BENTON COUNTY, WA
Existing Simulation with Direction
Option 1 Turbine Location
Proposed Substation
Proposed Transmission Line
Project Lease Boundary
Solar Siting Area
Existing Turbine
Existing Substation
Existing Transmission Line
TETRA TECH
Reference Map
Canada
Washington
Oregon
1
2a
2b
2c
3
4a
4b
5
6
7
8a
8b
9
10
11
12
13
1:150,000 WGS 1984 UTM Zone 11N
0 1 2 4 6 8 Miles
NOT FOR CONSTRUCTION
R:\PROJECTS\HORSE_HEAVEN_6430\VIEWSHED\MAPS\VIEWPOINTS\REPRESENTATIVE_VP_LOCATIONS.aprx

ATTACHMENT B

Visual Simulations

This page intentionally left blank.

Existing Conditions

Project Simulation Option 1
244 WTG

Project Simulation Option 2
150 WTG

Horse Heaven Wind Project

SCOUT CLEAN ENERGY

Figure 1
Representative Viewpoint 1
Existing Conditions and Project Simulations

BENTON COUNTY, WA

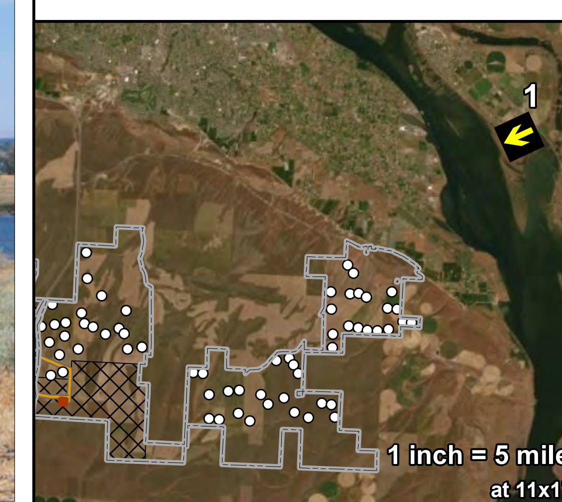
- Viewpoint Location and Photo Direction
- Project Lease Boundary
- Proposed Turbine Location
- Proposed Substation/BESS
- Proposed Transmission Line
- Solar Siting Area

View direction (deg):	244
Horizontal field of view (deg):..............	75
Vertical field of view (deg):..................	20
Max. WTGs within field of view:...	244 / 150
Max. Visible WTGs at tip height:..	199 / 137
Max. Visible WTGs at hub height:	148 / 107
Closest WTG (mi):........................	5.2 / 5.8
Furthest WTG (mi):....................	26.8 / 26.5
Closest Solar Array (mi):...............	No view
Closest Transmission Line (mi):.....	No view
Closest Substation / BESS (mi):..	No view

To approximate how the project will appear to a viewer in the natural setting, this sheet should be printed at 11 x 17 inches, full size with no scaling, and viewed at 6 inches from the eye. If viewed on a computer monitor, the document should be scaled at 100% and viewed at 6 inches from the eye.

NOT FOR CONSTRUCTION

TETRA TECH



R:\PROJECTS\HORSE_HEAVEN_6430\VIEWSHED\MAPS\VISUAL_SIMULATION_PHOTOS_20211006.mxd

Horse Heaven Wind Project

SCOUT CLEAN ENERGY

Figure 2
Representative Viewpoint 2a

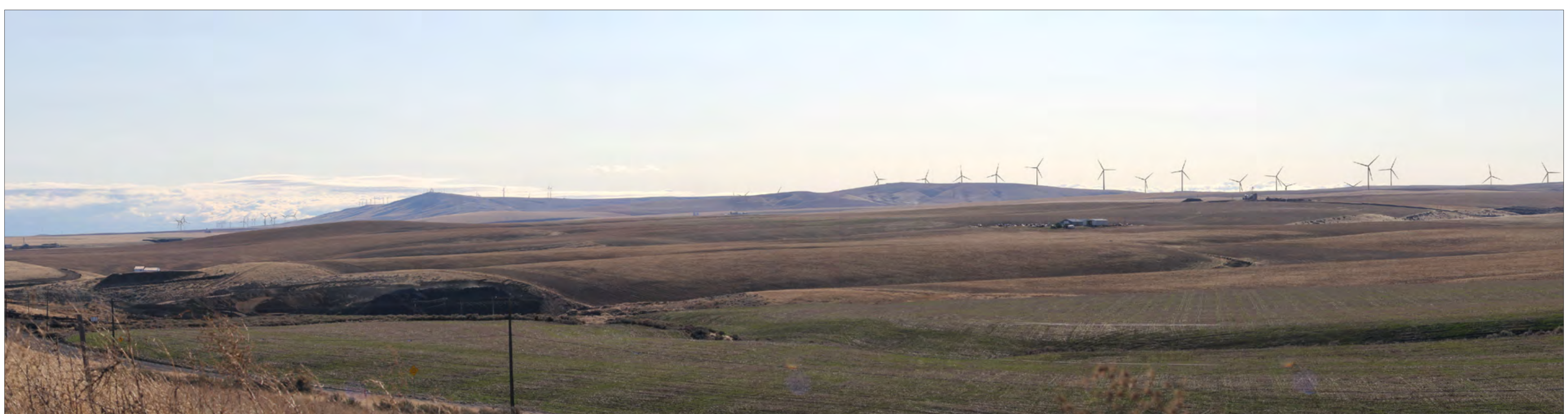
Existing Conditions and Project Simulations

BENTON COUNTY, WA

Existing Conditions

Project Simulation Option 1
244 WTG

Project Simulation Option 2
150 WTG



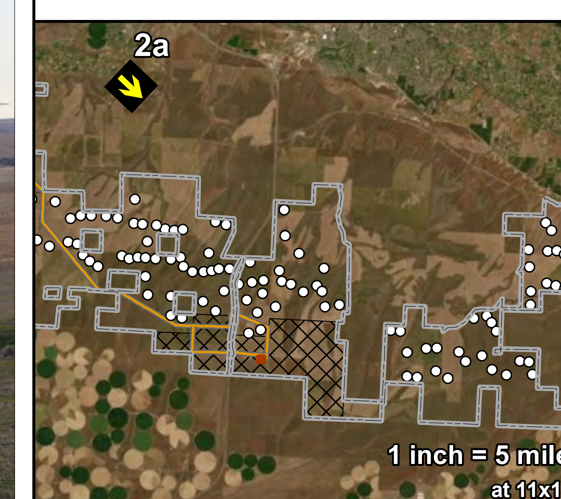
- Viewpoint Location and Photo Direction
- Project Lease Boundary
- Proposed Turbine Location
- Proposed Substation/BESS
- Proposed Transmission Line
- Solar Siting Area

View direction (deg):	132
Horizontal field of view (deg):	57
Vertical field of view (deg):	15
Max. WTGs within field of view:	75 / 38
Max. Visible WTGs at tip height:	56 / 29
Max. Visible WTGs at hub height:	50 / 24
Closest WTG (mi):	3.9 / 4.8
Furthest WTG (mi):	13.4 / 13
Closest Solar Array (mi):	No view
Closest Transmission Line (mi):	No view
Closest Substation / BESS (mi):	No view

To approximate how the project will appear to a viewer in the natural setting, this sheet should be printed at 11 x 17 inches, full size with no scaling, and viewed at 8 inches from the eye. If viewed on a computer monitor, the document should be scaled at 100% and viewed at 8 inches from the eye.

NOT FOR CONSTRUCTION

TETRA TECH

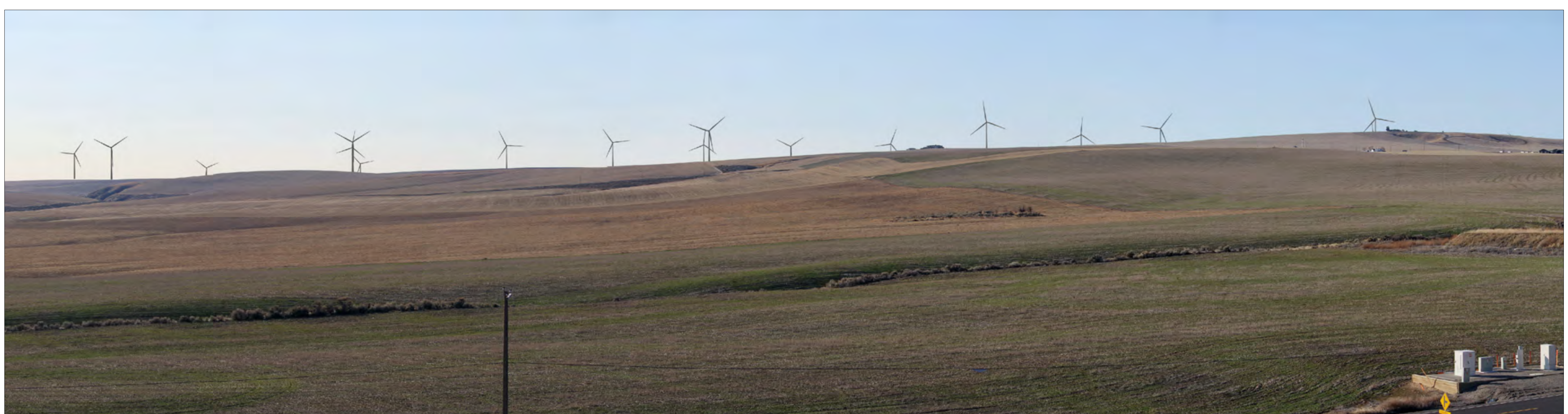


R:\PROJECTS\HORSE_HEAVEN_6430\VIEWSHED\MAPS\VISUAL_SIMULATION_PHOTOS_20211006.mxd

Existing Conditions

Project Simulation Option 1
244 WTG

Project Simulation Option 2
150 WTG



Horse Heaven Wind Project

SCOUT CLEAN ENERGY

Figure 3
Representative Viewpoint 2b

Existing Conditions and Project Simulations

BENTON COUNTY, WA

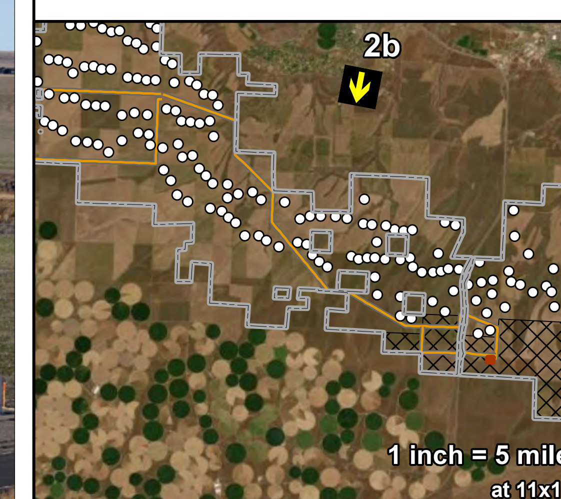
Viewpoint Location and Photo Direction
Project Lease Boundary
Proposed Turbine Location
Proposed Substation/BESS
Proposed Transmission Line
Solar Siting Area

View direction (deg):	189
Horizontal field of view (deg):	57
Vertical field of view (deg):	15
Max. WTGs within field of view:	37 / 19
Max. Visible WTGs at tip height:	36 / 19
Max. Visible WTGs at hub height:	30 / 17
Closest WTG (mi):	3 / 3.5
Furthest WTG (mi):	6.2 / 5.9
Closest Solar Array (mi):	No view
Closest Transmission Line (mi):	No view
Closest Substation / BESS (mi):	No view

To approximate how the project will appear to a viewer in the natural setting, this sheet should be printed at 11 x 17 inches, full size with no scaling, and viewed at 8 inches from the eye. If viewed on a computer monitor, the document should be scaled at 100% and viewed at 8 inches from the eye.

NOT FOR CONSTRUCTION

TETRA TECH



Existing Conditions

Project Simulation Option 1
244 WTG

Project Simulation Option 2
150 WTG

Horse Heaven Wind Project

SCOUT CLEAN ENERGY

Figure 4
Representative Viewpoint 2c

Existing Conditions and Project Simulations

BENTON COUNTY, WA

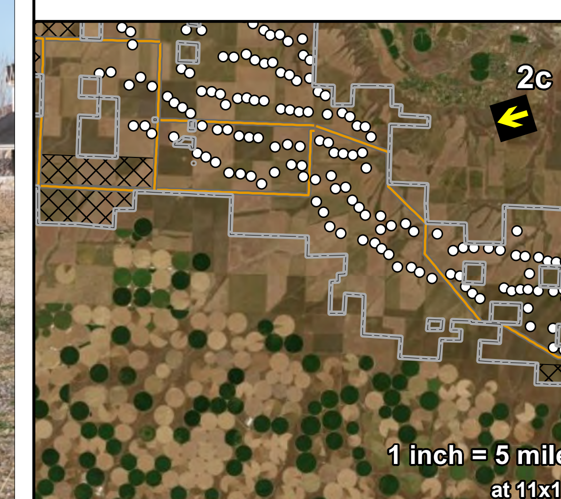
- Viewpoint Location and Photo Direction
- Project Lease Boundary
- Proposed Turbine Location
- Proposed Transmission Line
- Solar Siting Area

View direction (deg):	251
Horizontal field of view (deg):...............	56
Vertical field of view (deg):..................	15
Max. WTGs within field of view:...	85 / 60
Max. Visible WTGs at tip height:..	46 / 39
Max. Visible WTGs at hub height:	24 / 21
Closest WTG (mi):.......................	3.7 / 3.7
Furthest WTG (mi):.....................	10.8 / 10.8
Closest Solar Array (mi):...............	No view
Closest Transmission Line (mi):.....	3.4
Closest Substation / BESS (mi):..	No view

To approximate how the project will appear to a viewer in the natural setting, this sheet should be printed at 11 x 17 inches, full size with no scaling, and viewed at 8 inches from the eye. If viewed on a computer monitor, the document should be scaled at 100% and viewed at 8 inches from the eye.

NOT FOR CONSTRUCTION

TETRA TECH



R:\PROJECTS\HORSE_HEAVEN_6430\VIEWSHED\MAPS\VISUAL_SIMULATION_PHOTOS_20211006.mxd

Existing Conditions

Project Simulation Option 1
244 WTG

Project Simulation Option 2
150 WTG

Horse Heaven Wind Project

SCOUT CLEAN ENERGY

Figure 5
Representative Viewpoint 3

Existing Conditions and Project Simulations

BENTON COUNTY, WA

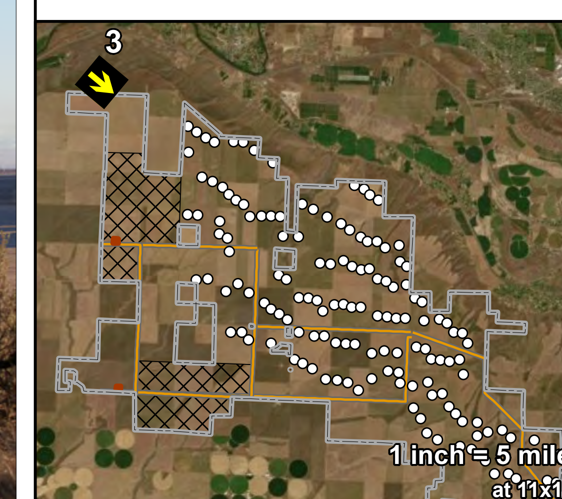
- Viewpoint Location and Photo Direction
- Project Lease Boundary
- Proposed Turbine Location
- Proposed Substation/BESS
- Proposed Transmission Line
- Solar Siting Area

View direction (deg):	128
Horizontal field of view (deg):...............	56
Vertical field of view (deg):..................	15
Max. WTGs within field of view:...	244 / 150
Max. Visible WTGs at tip height:..	239 / 150
Max. Visible WTGs at hub height:	219 / 139
Closest WTG (mi):.........................	2.5 / 2.8
Furthest WTG (mi):.....................	28.1 / 27.6
Closest Solar Array (mi):...............	2.1
Closest Transmission Line (mi):.....	4.2
Closest Substation / BESS (mi):..	Not in frame

To approximate how the project will appear to a viewer in the natural setting, this sheet should be printed at 11 x 17 inches, full size with no scaling, and viewed at 8 inches from the eye. If viewed on a computer monitor, the document should be scaled at 100% and viewed at 8 inches from the eye.

NOT FOR CONSTRUCTION

TETRA TECH



R:\PROJECTS\HORSE_HEAVEN_6430\VIEWSHED\MAPS\VISUAL_SIMULATION_PHOTOS_20211006.mxd

Existing Conditions

Project Simulation Option 1
244 WTG

Project Simulation Option 2
150 WTG

Horse Heaven Wind Project

SCOUT CLEAN ENERGY

Figure 6
Representative Viewpoint 4a

Existing Conditions and Project Simulations

BENTON COUNTY, WA

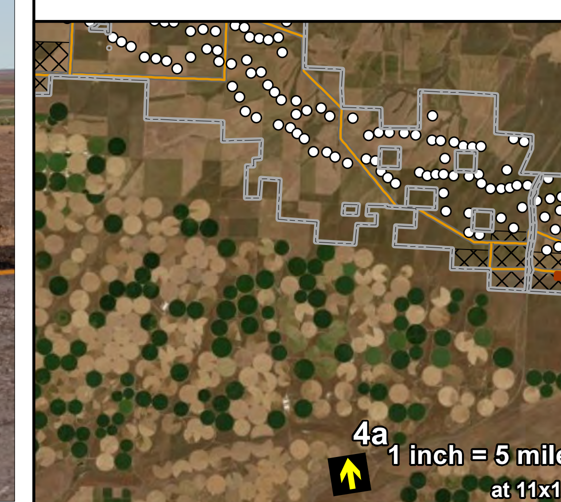
- Viewpoint Location and Photo Direction
- Project Lease Boundary
- Proposed Turbine Location
- Proposed Substation/BESS
- Proposed Transmission Line
- Solar Siting Area

View direction (deg):	350
Horizontal field of view (deg):...............	57
Vertical field of view (deg):...................	15
Max. WTGs within field of view:...	163 / 110
Max. Visible WTGs at tip height:..	51 / 40
Max. Visible WTGs at hub height:	34 / 26
Closest WTG (mi):........................	7.3 / 7.3
Furthest WTG (mi):....................	19.6 / 19.4
Closest Solar Array (mi):..............	Not in frame
Closest Transmission Line (mi):.....	6.5
Closest Substation / BESS (mi):..	Not in frame

To approximate how the project will appear to a viewer in the natural setting, this sheet should be printed at 11 x 17 inches, full size with no scaling, and viewed at 8 inches from the eye. If viewed on a computer monitor, the document should be scaled at 100% and viewed at 8 inches from the eye.

NOT FOR CONSTRUCTION

TETRA TECH



R:\PROJECTS\HORSE_HEAVEN_6430\VIEWSHED\MAPS\VISUAL_SIMULATION_PHOTOS_20211006.mxd

Horse Heaven Wind Project

SCOUT CLEAN ENERGY

Figure 7
Representative Viewpoint 4b

Existing Conditions and Project Simulations

BENTON COUNTY, WA

Existing Conditions

Project Simulation Option 1
244 WTG

Project Simulation Option 2
150 WTG

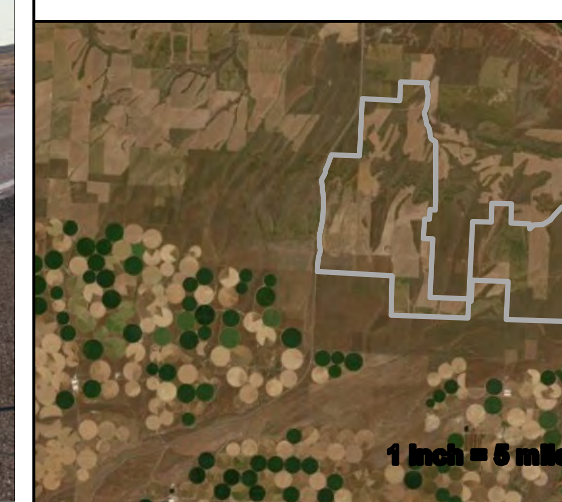
Viewpoint Location and Photo Direction
Project Lease Boundary
Proposed Turbine Location
Proposed Substation/BESS
Proposed Transmission Line
Solar Siting Area

View direction (deg):	46
Horizontal field of view (deg):...............	57
Vertical field of view (deg):..................	15
Max. WTGs within field of view:...	85 / 42
Max. Visible WTGs at tip height:..	66 / 37
Max. Visible WTGs at hub height:	58 / 33
Closest WTG (mi):.......................	7 / 7.3
Furthest WTG (mi):.....................	16.2 / 15.6
Closest Solar Array (mi):...............	6.0
Closest Transmission Line (mi):.....	6.5
Closest Substation / BESS (mi):..	7.3

To approximate how the project will appear to a viewer in the natural setting, this sheet should be printed at 11 x 17 inches, full size with no scaling, and viewed at 8 inches from the eye. If viewed on a computer monitor, the document should be scaled at 100% and viewed at 8 inches from the eye.

NOT FOR CONSTRUCTION

TETRA TECH



R:\PROJECTS\HORSE_HEAVEN_6430\VIEWSHED\MAPS\VISUAL_SIMULATION_PHOTOS_20211006.mxd

Existing Conditions

Project Simulation Option 1
244 WTG

Project Simulation Option 2
150 WTG

Horse Heaven Wind Project

SCOUT CLEAN ENERGY

Figure 8
Representative Viewpoint 5

Existing Conditions and Project Simulations

BENTON COUNTY, WA

- Viewpoint Location and Photo Direction
- Project Lease Boundary
- Proposed Turbine Location
- Proposed Transmission Line
- Solar Siting Area

View direction (deg):	236
Horizontal field of view (deg):...............	58
Vertical field of view (deg):...................	15
Max. WTGs within field of view:...	101 / 76
Max. Visible WTGs at tip height:..	101 / 76
Max. Visible WTGs at hub height:	101 / 76
Closest WTG (mi):........................	4.7 / 4.7
Furthest WTG (mi):.....................	9.9 / 9.8
Closest Solar Array (mi):...............	No view
Closest Transmission Line (mi):.....	No view
Closest Substation / BESS (mi):..	No view

To approximate how the project will appear to a viewer in the natural setting, this sheet should be printed at 11 x 17 inches, full size with no scaling, and viewed at 8 inches from the eye. If viewed on a computer monitor, the document should be scaled at 100% and viewed at 8 inches from the eye.

NOT FOR CONSTRUCTION

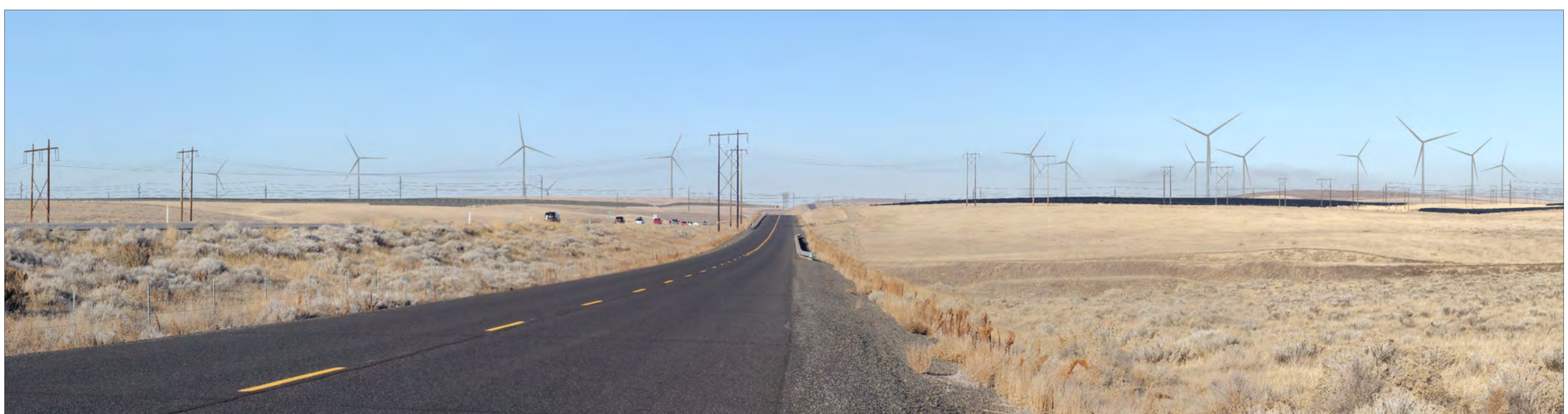
TETRA TECH

R:\PROJECTS\HORSE_HEAVEN_6430\VIEWSHED\MAPS\VISUAL_SIMULATION_PHOTOS_20211006.mxd

Existing Conditions

Project Simulation Option 1
244 WTG

Project Simulation Option 2
150 WTG



Horse Heaven Wind Project

SCOUT CLEAN ENERGY

Figure 9
Representative Viewpoint 6

Existing Conditions and Project Simulations

BENTON COUNTY, WA

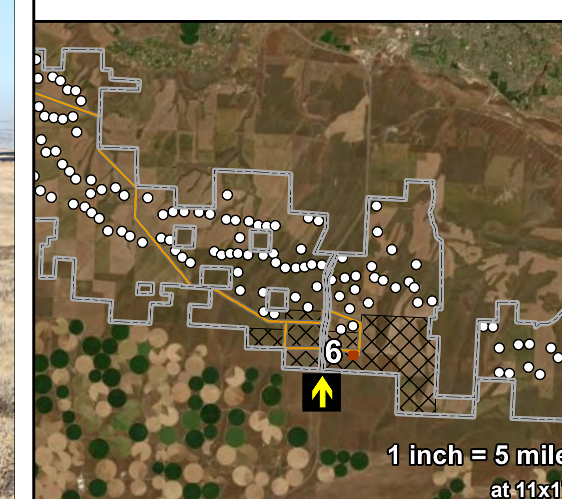
- Viewpoint Location and Photo Direction
- Project Lease Boundary
- Proposed Turbine Location
- Proposed Substation/BESS
- Proposed Transmission Line
- Solar Siting Area

View direction (deg):	360
Horizontal field of view (deg):...............	60
Vertical field of view (deg):..................	15
Max. WTGs within field of view:...	41 / 17
Max. Visible WTGs at tip height:..	37 / 17
Max. Visible WTGs at hub height:	29 / 17
Closest WTG (mi):........................	1.7 / 1.8
Furthest WTG (mi):....................	5.7 / 5
Closest Solar Array (mi):...............	0.6
Closest Transmission Line (mi):.....	1.2
Closest Substation / BESS (mi):..	Not in frame

To approximate how the project will appear to a viewer in the natural setting, this sheet should be printed at 11 x 17 inches, full size with no scaling, and viewed at 8 inches from the eye. If viewed on a computer monitor, the document should be scaled at 100% and viewed at 8 inches from the eye.

NOT FOR CONSTRUCTION

TETRA TECH

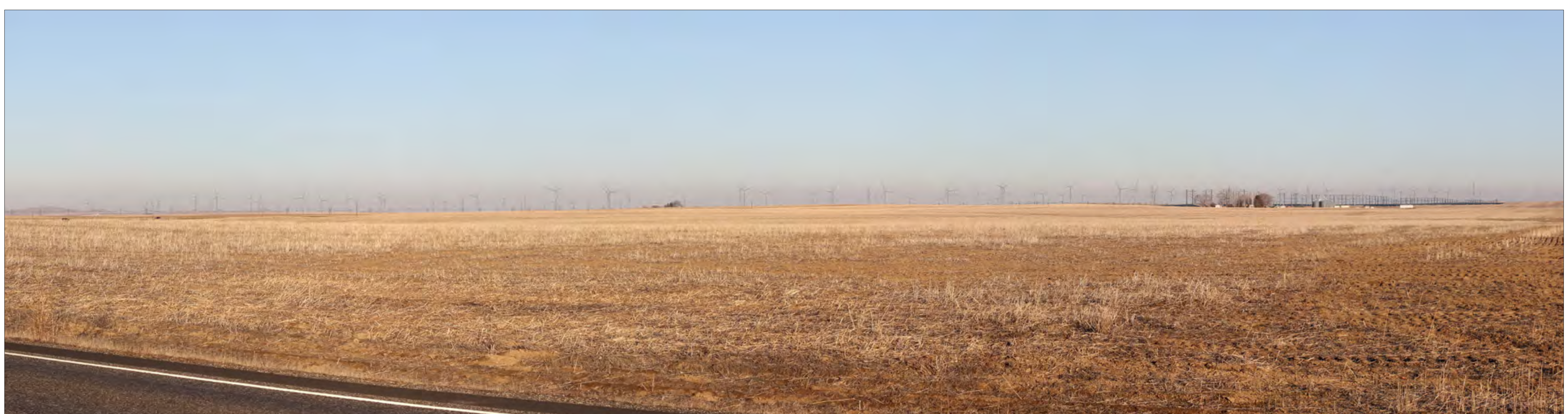


R:\PROJECTS\HORSE_HEAVEN_6430\VIEWSHED\MAPS\VISUAL_SIMULATION_PHOTOS_20211006.mxd

Existing Conditions

Project Simulation Option 1
244 WTG

Project Simulation Option 2
150 WTG



Horse Heaven Wind Project

SCOUT CLEAN ENERGY

Figure 10
Representative Viewpoint 7

Existing Conditions and Project Simulations

BENTON COUNTY, WA

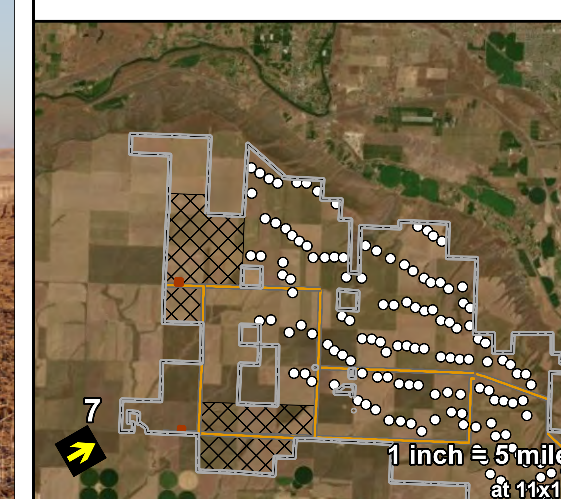
- Viewpoint Location and Photo Direction
- Project Lease Boundary
- Proposed Turbine Location
- Proposed Substation/BESS
- Proposed Transmission Line
- Solar Siting Area

View direction (deg):	60
Horizontal field of view (deg):...............	58
Vertical field of view (deg):..................	15
Max. WTGs within field of view:...	122 / 90
Max. Visible WTGs at tip height:..	118 / 87
Max. Visible WTGs at hub height:	110 / 85
Closest WTG (mi):........................	5.8 / 5.8
Furthest WTG (mi):.....................	11.9 / 11.8
Closest Solar Array (mi):...............	3.1
Closest Transmission Line (mi):.....	2.2
Closest Substation / BESS (mi):..	No view

To approximate how the project will appear to a viewer in the natural setting, this sheet should be printed at 11 x 17 inches, full size with no scaling, and viewed at 8 inches from the eye. If viewed on a computer monitor, the document should be scaled at 100% and viewed at 8 inches from the the eye.

NOT FOR CONSTRUCTION

TETRA TECH



Horse Heaven Wind Project

SCOUT CLEAN ENERGY

Figure 11
Representative Viewpoint 8a

Existing Conditions and Project Simulations

BENTON COUNTY, WA

Existing Conditions

Project Simulation Option 1
244 WTG

Project Simulation Option 2
150 WTG

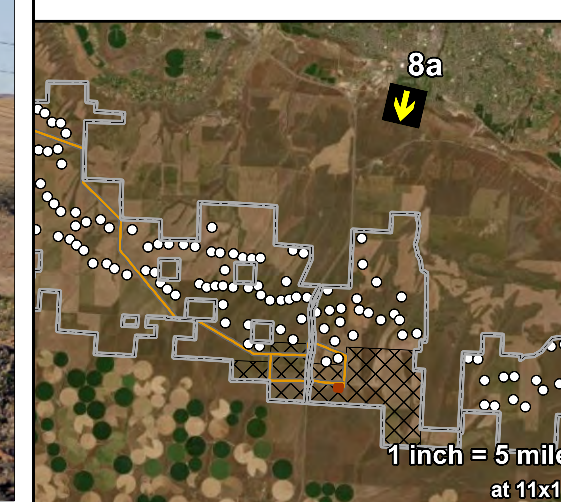
- Viewpoint Location and Photo Direction
- Project Lease Boundary
- Proposed Turbine Location
- Proposed Substation/BESS
- Proposed Transmission Line
- Solar Siting Area

View direction (deg):	193
Horizontal field of view (deg):...............	57
Vertical field of view (deg):..................	15
Max. WTGs within field of view:...	43 / 20
Max. Visible WTGs at tip height:..	40 / 19
Max. Visible WTGs at hub height:	37 / 15
Closest WTG (mi):........................	3.6 / 5.4
Furthest WTG (mi):....................	7.4 / 7.3
Closest Solar Array (mi):...............	No view
Closest Transmission Line (mi):.....	No view
Closest Substation / BESS (mi):..	No view

To approximate how the project will appear to a viewer in the natural setting, this sheet should be printed at 11 x 17 inches, full size with no scaling, and viewed at 8 inches from the eye. If viewed on a computer monitor, the document should be scaled at 100% and viewed at 8 inches from the eye.

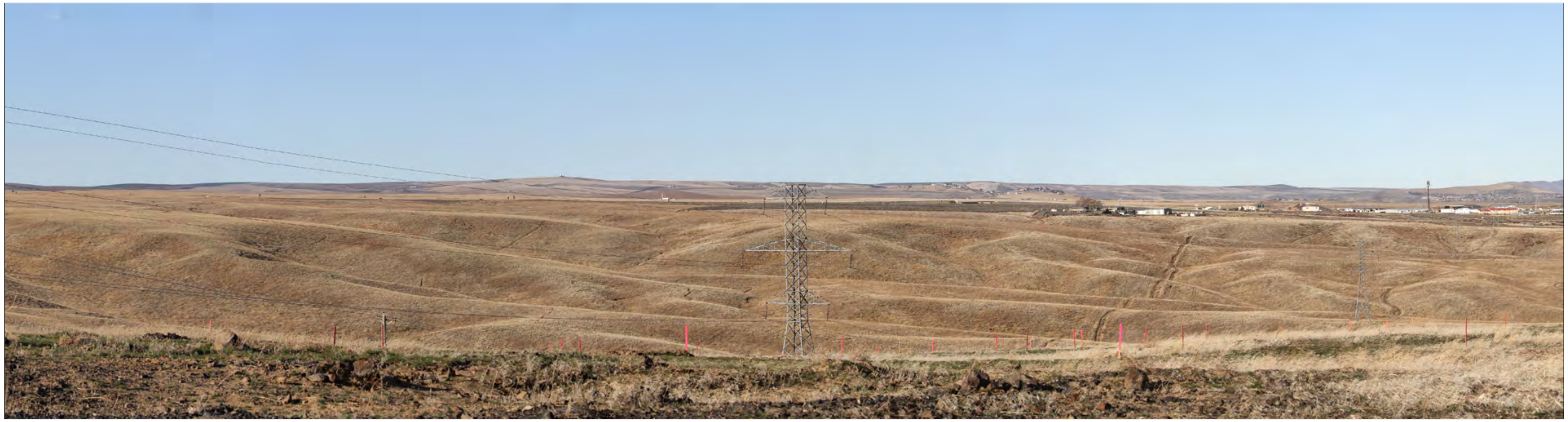
NOT FOR CONSTRUCTION

TETRA TECH

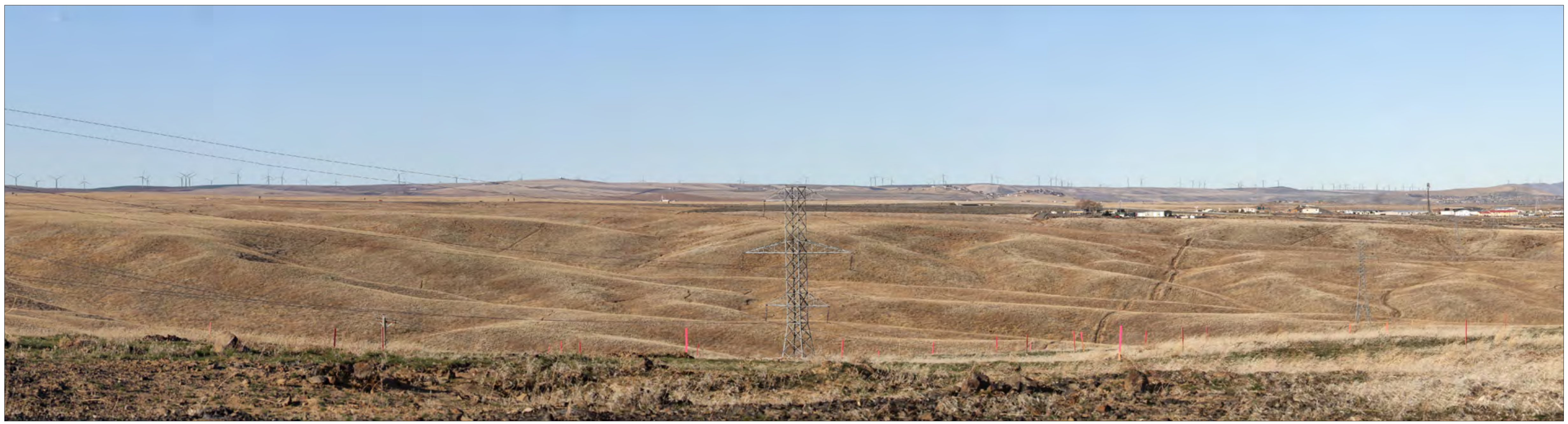


R:\PROJECTS\HORSE_HEAVEN_6430\VIEWSHED\MAPS\VISUAL_SIMULATION_PHOTOS_20211006.mxd

Existing Conditions



Project Simulation Option 1
244 WTG



Project Simulation Option 2
150 WTG

Horse Heaven Wind Project

SCOUT CLEAN ENERGY

Figure 12
Representative Viewpoint 8b

Existing Conditions and Project Simulations

BENTON COUNTY, WA

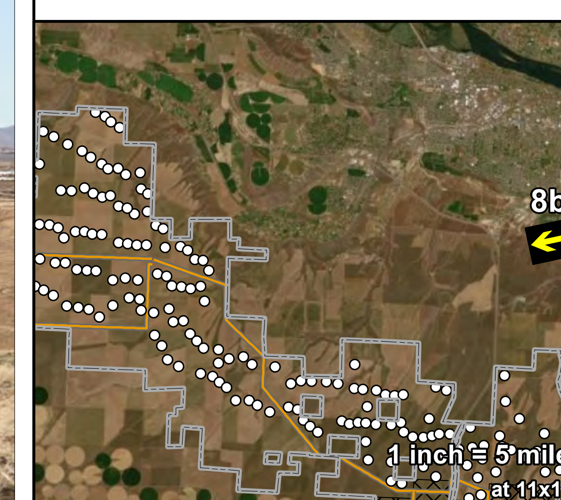
- Viewpoint Location and Photo Direction
- Project Lease Boundary
- Proposed Turbine Location
- Proposed Transmission Line
- Solar Siting Area

View direction (deg):	258
Horizontal field of view (deg):...............	57
Vertical field of view (deg):..................	15
Max. WTGs within field of view:...	153 / 105
Max. Visible WTGs at tip height:..	137 / 101
Max. Visible WTGs at hub height:	102 / 83
Closest WTG (mi):.........................	5.9 / 6.1
Furthest WTG (mi):.....................	16.8 / 16.6
Closest Solar Array (mi):...............	No view
Closest Transmission Line (mi):.....	No view
Closest Substation / BESS (mi):..	No view

To approximate how the project will appear to a viewer in the natural setting, this sheet should be printed at 11 x 17 inches, full size with no scaling, and viewed at 8 inches from the eye. If viewed on a computer monitor, the document should be scaled at 100% and viewed at 8 inches from the eye.

NOT FOR CONSTRUCTION

TETRA TECH



R:\PROJECTS\HORSE_HEAVEN_6430\VIEWSHED\MAPS\VISUAL_SIMULATION_PHOTOS_20211006.mxd

Horse Heaven Wind Project

SCOUT CLEAN ENERGY

Figure 13
Representative Viewpoint 9

Existing Conditions and Project Simulations

BENTON COUNTY, WA

Existing Conditions

Project Simulation Option 1
244 WTG

Project Simulation Option 2
150 WTG

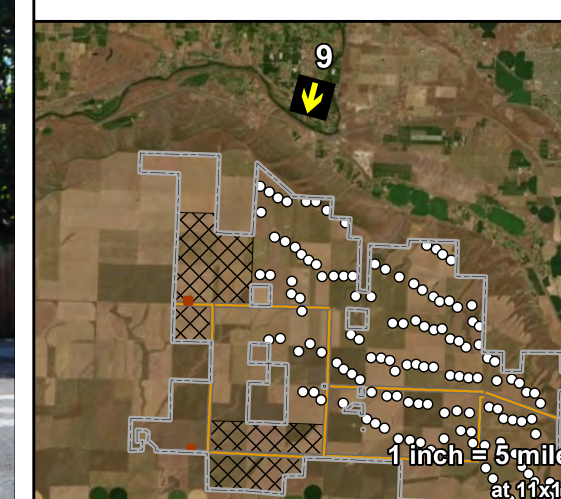
- Viewpoint Location and Photo Direction
- Project Lease Boundary
- Proposed Turbine Location
- Proposed Substation/BESS
- Proposed Transmission Line
- Solar Siting Area

View direction (deg):	195
Horizontal field of view (deg):...............	73
Vertical field of view (deg):..................	19
Max. WTGs within field of view:...	61 / 47
Max. Visible WTGs at tip height:..	5 / 5
Max. Visible WTGs at hub height:	4 / 4
Closest WTG (mi):........................	2.7 / 2.7
Furthest WTG (mi):.....................	9.7 / 9.6
Closest Solar Array (mi):...............	No view
Closest Transmission Line (mi):.....	No view
Closest Substation / BESS (mi):..	No view

To approximate how the project will appear to a viewer in the natural setting, this sheet should be printed at 11 x 17 inches, full size with no scaling, and viewed at 6 inches from the eye. If viewed on a computer monitor, the document should be scaled at 100% and viewed at 6 inches from the eye.

NOT FOR CONSTRUCTION

TETRA TECH



R:\PROJECTS\HORSE_HEAVEN_6430\VIEWSHED\MAPS\VISUAL_SIMULATION_PHOTOS_20211006.mxd

Horse Heaven Wind Project

SCOUT CLEAN ENERGY

Figure 14
Representative Viewpoint 10

Existing Conditions and Project Simulations

BENTON COUNTY, WA

Existing Conditions

Project Simulation Option 1
244 WTG

Project Simulation Option 2
150 WTG

- Viewpoint Location and Photo Direction
- Project Lease Boundary
- Proposed Turbine Location
- Proposed Substation/BESS
- Proposed Transmission Line
- Solar Siting Area

View direction (deg):	241
Horizontal field of view (deg):...............	76
Vertical field of view (deg):..................	20
Max. WTGs within field of view:...	79 / 59
Max. Visible WTGs at tip height:..	15 / 15
Max. Visible WTGs at hub height:	9 / 7
Closest WTG (mi):........................	1.5 / 1.5
Furthest WTG (mi):......................	6.6 / 6.6
Closest Solar Array (mi):...............	No view
Closest Transmission Line (mi):.....	No view
Closest Substation / BESS (mi):..	No view

To approximate how the project will appear to a viewer in the natural setting, this sheet should be printed at 11 x 17 inches, full size with no scaling, and viewed at 6 inches from the eye. If viewed on a computer monitor, the document should be scaled at 100% and viewed at 6 inches from the eye.

NOT FOR CONSTRUCTION

TETRA TECH

R:\PROJECTS\HORSE_HEAVEN_6430\VIEWSHED\MAPS\VISUAL_SIMULATION_PHOTOS_20211006.mxd

Existing Conditions

Project Simulation Option 1
244 WTG

Project Simulation Option 2
150 WTG

Horse Heaven Wind Project

SCOUT CLEAN ENERGY

Figure 15
Representative Viewpoint 11

Existing Conditions and Project Simulations

BENTON COUNTY, WA

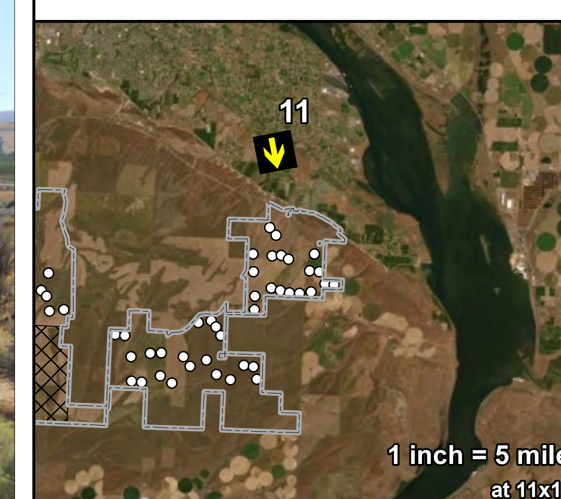
- Viewpoint Location and Photo Direction
- Project Lease Boundary
- Proposed Turbine Location
- Solar Siting Area

View direction (deg):	169
Horizontal field of view (deg):...............	73
Vertical field of view (deg):..................	19
Max. WTGs within field of view:...	33 / 47
Max. Visible WTGs at tip height:..	23 / 12
Max. Visible WTGs at hub height:	19 / 11
Closest WTG (mi):........................	2 / 2.5
Furthest WTG (mi):.....................	6.6 / 6.6
Closest Solar Array (mi):...............	No view
Closest Transmission Line (mi):.....	No view
Closest Substation / BESS (mi):..	No view

To approximate how the project will appear to a viewer in the natural setting, this sheet should be printed at 11 x 17 inches, full size with no scaling, and viewed at 6 inches from the eye. If viewed on a computer monitor, the document should be scaled at 100% and viewed at 6 inches from the eye.

NOT FOR CONSTRUCTION

TETRA TECH



R:\PROJECTS\HORSE_HEAVEN_6430\VIEWSHED\MAPS\VISUAL_SIMULATION_PHOTOS_20211006.mxd

Existing Conditions

Project Simulation Option 1
244 WTG

Project Simulation Option 2
150 WTG

Horse Heaven Wind Project

SCOUT CLEAN ENERGY

Figure 16
Representative Viewpoint 12

Existing Conditions and Project Simulations

BENTON COUNTY, WA

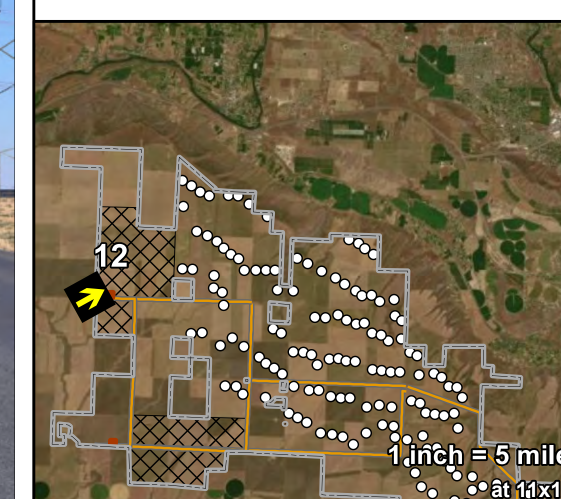
- Viewpoint Location and Photo Direction
- Project Lease Boundary
- Proposed Turbine Location
- Proposed Substation/BESS
- Proposed Transmission Line
- Solar Siting Area

View direction (deg):	61
Horizontal field of view (deg):...............	73
Vertical field of view (deg):..................	19
Max. WTGs within field of view:...	57 / 40
Max. Visible WTGs at tip height:..	53 / 40
Max. Visible WTGs at hub height:	52 / 37
Closest WTG (mi):........................	2.5 / 2.5
Furthest WTG (mi):.....................	8.7 / 8.6
Closest Solar Array (mi):...............	0.2
Closest Transmission Line (mi):.....	0.2
Closest Substation / BESS (mi):..	0.5

To approximate how the project will appear to a viewer in the natural setting, this sheet should be printed at 11 x 17 inches, full size with no scaling, and viewed at 6 inches from the eye. If viewed on a computer monitor, the document should be scaled at 100% and viewed at 6 inches from the eye.

NOT FOR CONSTRUCTION

TETRA TECH



R:\PROJECTS\HORSE_HEAVEN_6430\VIEWSHED\MAPS\VISUAL_SIMULATION_PHOTOS_20211006.mxd

Existing Conditions

Project Simulation Option 1
244 WTG

Project Simulation Option 2
150 WTG

Horse Heaven Wind Project

SCOUT CLEAN ENERGY

Figure 17
Representative Viewpoint 13

Existing Conditions and Project Simulations

BENTON COUNTY, WA

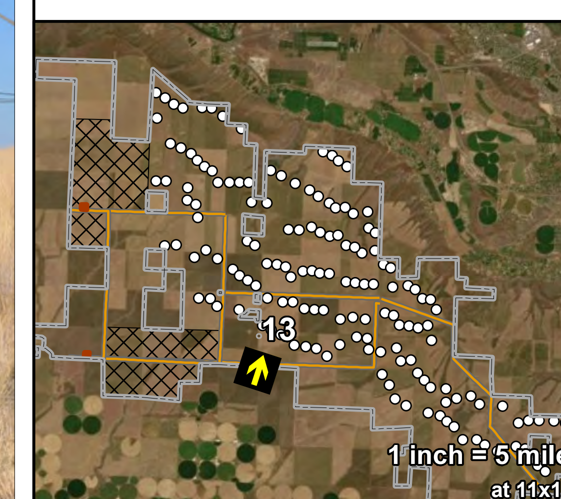
- Viewpoint Location and Photo Direction
- Project Lease Boundary
- Proposed Turbine Location
- Proposed Substation/BESS
- Proposed Transmission Line
- Solar Siting Area

View direction (deg):	18
Horizontal field of view (deg):...............	73
Vertical field of view (deg):...................	19
Max. WTGs within field of view:...	73 / 54
Max. Visible WTGs at tip height:..	69 / 52
Max. Visible WTGs at hub height:	65 / 51
Closest WTG (mi):.......................	1.1 / 1.1
Furthest WTG (mi):....................	7.3 / 7.1
Closest Solar Array (mi):.............	Not in frame
Closest Transmission Line (mi):.....	0.2
Closest Substation / BESS (mi):..	No view

To approximate how the project will appear to a viewer in the natural setting, this sheet should be printed at 11 x 17 inches, full size with no scaling, and viewed at 6 inches from the eye. If viewed on a computer monitor, the document should be scaled at 100% and viewed at 6 inches from the eye.

NOT FOR CONSTRUCTION

TETRA TECH



R:\PROJECTS\HORSE_HEAVEN_6430\VIEWSHED\MAPS\VISUAL_SIMULATION_PHOTOS_20211006.mxd

APPENDIX 3.16-1

Horse Heaven Wind Farm's Proximity to other Environmental Stressors

This Page Intentionally Left Blank

Proximity to other Environmental Stressors

Table 3.16-1A provides additional information regarding additional environmental justice indexes, including traffic proximity, superfund proximity, hazardous waste proximity, underground storage tanks counts, and wastewater discharge toxicity, for the census block groups that intersect with or are adjacent to the Lease Area in the Horse Heaven Wind Farm study area.

According to the U.S. Environmental Protection Agency Environmental Justice Screening and Mapping Tool (EJ Screen) data, the "Value" and "State Average" columns in **Table 3.16-1A** for each of these environmental stressors are defined as follows:

- Traffic proximity - Count of vehicles (annual daily traffic) at major roads within 500 meters, divided by distance in meters (not km)
- Superfund proximity - Count of proposed superfund sites within 5 km (or nearest one beyond 5 km), each divided by distance in kilometers
- Hazardous waste proximity - Count of hazardous waste facilities within 5 km (or nearest beyond 5 km), each divided by distance in kilometers
- Underground storage tanks (USTs) - Count of leaking UST (LUSTs) (multiplied by a factor of 7.7) and the number of USTs within a 1,500-foot buffered block group
- Wastewater discharge – Risk Screening Environmental Indicators modeled toxic concentrations at stream segments within 500 meters, divided by distance in kilometers (km)

Table 3.16-1A: Environmental Justice Indexes for the Census Block Groups that Intersect with or Located Adjacent to Project Lease Boundary

Environmental Stressors	Census Block Group	Value	State Average
Traffic Proximity (daily traffic count/distance to road)	Census Tract 108.07, Block Group 1	83	740
	Census Tract 108.14, Block Group 1	57	
	Census Tract 115.01, Block Group 1	2.3	
	Census Tract 115.06, Block Group 1	8.9	
	Census Tract 116, Block Group 1	3.4	
	Census Tract 118.01, Block Group 3	89	
Superfund Proximity (site count/km distance)	Census Tract 108.07, Block Group 1	0.061	0.18
	Census Tract 108.14, Block Group 1	0.048	
	Census Tract 115.01, Block Group 1	0.078	
	Census Tract 115.06, Block Group	0.077	
	Census Tract 116, Block Group 1	0.055	
	Census Tract 118.01, Block Group 3	0.035	

Table 3.16-1A: Environmental Justice Indexes for the Census Block Groups that Intersect with or Located Adjacent to Project Lease Boundary

Environmental Stressors	Census Block Group	Value	State Average
Hazardous Waste Proximity (facility count/ km distance)	Census Tract 108.07, Block Group 1	0.26	2.2
	Census Tract 108.14, Block Group 1	0.13	
	Census Tract 115.01, Block Group 1	0.9	
	Census Tract 115.06, Block Group 1	0.28	
	Census Tract 116, Block Group 1	0.068	
	Census Tract 118.01, Block Group 3	0.082	
Underground Storage Tanks (USTs) (count/km^2)	Census Tract 108.07, Block Group 1	0.058	6.3
	Census Tract 108.14, Block Group 1	0.086	
	Census Tract 115.01, Block Group 1	0	
	Census Tract 115.06, Block Group 1	0.03	
	Census Tract 116, Block Group 1	0.0058	
	Census Tract 118.01, Block Group 3	0.01	
Wastewater Discharge (toxicity-weighted concentration/m distance)	Census Tract 108.07, Block Group 1	4.4E-06	0.021
	Census Tract 108.14, Block Group 1	N/A	
	Census Tract 115.01, Block Group 1	0.0012	
	Census Tract 115.06, Block Group 1	N/A	
	Census Tract 116, Block Group 1	0.00021	
	Census Tract 118.01, Block Group 3	4.3E-08	

Source: EJ Screen (Environmental Justice Screening and Mapping Tool). 2022. Accessed September 20, 2022. https://www.epa.gov/ejscreen.
km = kilometers; km^2 = square kilometers; N/A = information not available

APPENDIX 4.3-1

Emission Calculations

This Page Intentionally Left Blank

Horse Heaven Wind Farm LLC's Emission Calculations

This Page Intentionally Left Blank

Horse Heaven Wind Farm - Construction Emissions
Emission Summary by Phase and Calendar Year

Emission Totals by Phase	VOC tons	NO_X tons	CO tons	PM_{10} tons	$PM_{2.5}$ tons	SO_2 tons	HAP Tons	CO_2 tons	CH_4 tons	N_2O tons	CO_2e tons
Phase 1 Wind	3.03	24.66	17.83	1.34	1.29	0.03	0.40	9,093.78	0.29	0.17	9,150.72
Phase 1 Solar	2.12	14.67	9.94	1.15	1.11	0.02	0.39	4,794.30	0.16	0.10	4,827.91
Phase 1 Battery	0.27	2.29	1.42	0.12	0.11	2.51E-03	0.03	806.49	0.03	1.37E-02	811.34
Phase 1 total	**5.43**	**41.63**	**29.19**	**2.61**	**2.51**	**0.05**	**0.82**	**14,694.57**	**0.48**	**0.28**	**14,789.97**
Phase 2a Wind	3.47	29.48	18.44	1.68	1.62	0.04	0.53	11,198.93	0.33	0.22	11,272.03
Phase 2a Solar	1.92	13.23	8.75	1.05	1.01	1.43E-02	0.36	4,547.13	0.15	0.10	4,579.36
Phase 2a Battery	0.25	2.12	1.27	0.11	0.11	2.47E-03	0.03	797.29	0.03	1.37E-02	802.14
Phase 2a total	**5.64**	**44.82**	**28.46**	**2.84**	**2.73**	**0.05**	**0.92**	**16,543.35**	**0.51**	**0.33**	**16,653.53**
Phase 2b Wind	4.27	36.73	22.69	2.04	1.96	0.04	0.64	13,857.79	0.41	0.27	13,947.13
Phase 2b total	**4.27**	**36.73**	**22.69**	**2.04**	**1.96**	**0.04**	**0.64**	**13,857.79**	**0.41**	**0.27**	**13,947.13**
O&M	0.07	0.28	0.62	9.43E-03	8.65E-03	5.46E-04	0	134.31	1.22E-02	1.00E-03	134.91
O&M total	**0.07**	**0.28**	**0.62**	**9.43E-03**	**8.65E-03**	**5.46E-04**	**0**	**134.31**	**1.22E-02**	**1.00E-03**	**134.91**

Emission Totals by Calendar Year	VOC tons	NO_X tons	CO tons	PM_{10} tons	$PM_{2.5}$ tons	SO_2 tons	HAP Tons	CO_2 tons	CH_4 tons	N_2O tons	CO_2e tons
2023 (Phase 1)	5.43	41.63	29.19	2.61	2.51	0.05	0.82	14,694.57	0.48	0.28	14,789.97
2024 (Maximum of Phase 2a or 2b)	5.64	44.82	28.46	2.84	2.73	0.05	0.92	16,543.35	0.51	0.33	16,653.53
2025 and onward (O&M)	0.07	0.28	0.62	9.43E-03	8.65E-03	5.46E-04	0	134.31	1.22E-02	1.00E-03	134.91

Horse Heaven Wind Farm - Construction Emissions
Summary of Construction Schedule by Phase

Proposed Phase 1 Construction Schedule

Task	Start	Finish
Road Construction	1/13/2023	5/3/2023
Wind Turbine Foundations	1/27/2023	4/26/2023
Wind Turbine Assembly	5/4/2023	8/21/2023
Wind Plant Commissioning	7/31/2023	10/30/2023
Solar Array Construction	1/1/2023	10/31/2023
Electrical System Installation	2/15/2023	9/1/2023
Battery Energy Storage System	5/4/2023	9/1/2023
Solar Plant Commissioning	9/1/2023	11/30/2023
Electrical System and Substation	2/15/2023	7/28/2023
O&M Building	3/17/2023	6/28/2023
Phase 1 Final Commercial Operation Date	**11/30/2023**	**-**

Proposed Phase 2a Construction Schedule

Task	Start	Finish
Road Construction	1/13/2024	5/3/2024
Wind Turbine Foundations	1/27/2024	4/26/2024
Wind Turbine Assembly	5/4/2024	8/21/2024
Wind Plant Commissioning	7/31/2024	10/30/2024
Solar Array Construction	1/1/2024	10/31/2024
Electrical System Installation	2/15/2024	9/1/2024
Battery Energy Storage System	5/4/2024	9/1/2024
Solar Plant Commissioning	9/1/2024	11/30/2024
Electrical System and Substation	2/15/2024	7/28/2024
O&M Facilities	3/17/2024	6/28/2024
Transmission Line Construction	1/1/2024	8/1/2024
Phase 2a Final Commercial Operation Date	**11/30/2024**	**-**

Proposed Phase 2b Construction Schedule

Task	Start	Finish
Road Construction	1/13/2024	5/3/2024
Wind Turbine Foundations	1/27/2024	4/26/2024
Electrical System and Substation	2/15/2024	7/28/2024
Wind Turbine Assembly	5/4/2024	8/21/2024
O&M Facilities	3/17/2024	6/28/2024
Transmission Line Construction	1/1/2024	8/1/2024
Plant Commissioning	7/31/2024	10/30/2024
Phase 2b Final Commercial Operation Date	**10/30/2024**	**-**

Adapted from Tables 2.15-2 through 2.15-4 of EFSEC application for site certification.

								Fuel Use	Emissions										
Construction Equipment	**Source Category**	**HP per unit**	**Fuel Type**	**Emiss. Factor ID**	**hrs per day**	**Load Factor**	**Total Equip. Months**	**gal**	**VOC tons**	**NO_X tons**	**CO tons**	**PM_{10} tons**	**$PM_{2.5}$ tons**	**SO_2 tons**	**HAP Tons**	**CO_2 tons**	**CH_4 tons**	**N_2O tons**	**CO_2e tons**
Site Prep & Road Const																			
Bulldozer	2270002069	200	diesel	107	12	59%	24	27,989	0.02	0.21	0.07	0.02	1.47E-02	1.14E-03	4.11E-03	422.26	1.17E-03	1.08E-02	425.49
Excavator / Backhoe	2270002036	150	diesel	108	12	59%	24	20,993	1.05E-02	0.21	0.07	0.02	0.02	8.49E-04	2.53E-03	316.70	8.82E-04	8.06E-03	319.13
Loader / Skid Steer loader	2270002072	150	diesel	116	12	21%	24	8,679	0.22	1.16	0.71	0.13	0.13	4.81E-04	0.05	130.94	1.11E-02	3.33E-03	132.21
Motor grader	2270002048	100	diesel	110	12	59%	24	13,994	1.09E-02	0.18	0.07	0.02	0.02	5.76E-04	2.62E-03	211.12	9.21E-04	5.38E-03	212.75
Vibratory Roller	2270002015	75	diesel	114	12	59%	18	8,741	1.04E-02	0.27	0.10	1.27E-02	1.23E-02	3.61E-04	2.51E-03	131.87	7.68E-04	3.36E-03	132.89
Dump / Belly Truck	-	-	diesel	302	-	-	72	12,804	0.03	0.48	0.20	1.31E-02	1.21E-02	4.87E-04	-	144.10	3.21E-03	3.13E-04	144.27
Water Truck	-	-	diesel	304	-	-	48	4,963	0.02	0.11	0.07	2.48E-03	2.28E-03	1.87E-04	-	55.85	8.11E-03	3.24E-04	56.15
Fuel Truck	-	-	diesel	304	-	-	12	1,241	4.78E-03	0.03	0.02	6.19E-04	5.70E-04	4.68E-05	-	13.96	2.03E-03	8.09E-05	14.04
Foundation																			
Rough Terrain Cranes	2270002045	200	diesel	106	12	43%	12	10,089	1.18E-02	0.14	0.03	6.58E-03	6.39E-03	4.19E-04	2.84E-03	152.20	8.21E-04	3.88E-03	153.37
Concrete pump truck	2270002042	200	diesel	105	12	43%	8	6,713	0.07	0.90	0.22	0.04	0.04	3.72E-04	0.02	101.28	3.70E-03	2.58E-03	102.14
Concrete Truck	2270002042	150	diesel	104	12	43%	64	40,268	0.50	5.77	1.49	0.31	0.30	2.23E-03	0.12	607.50	0.03	0.02	612.76
Backhoe or Excavator	2270002036	150	diesel	108	12	59%	16	13,995	6.99E-03	0.14	0.05	1.06E-02	1.02E-02	5.66E-04	1.69E-03	211.13	5.88E-04	5.38E-03	212.75
Forklifts	2270003020	75	diesel	109	12	59%	12	5,828	1.35E-03	0.13	1.19E-02	2.07E-03	2.01E-03	2.32E-04	3.25E-04	87.93	1.02E-04	2.24E-03	88.60
Skid Steer loader	2270002072	150	diesel	116	12	21%	8	2,893	0.07	0.39	0.24	0.04	0.04	1.60E-04	0.02	43.65	3.69E-03	1.11E-03	44.07
Dump Truck	-	-	diesel	302	-	-	24	4,268	9.13E-03	0.16	0.07	4.38E-03	4.03E-03	1.62E-04	-	48.03	1.07E-03	1.04E-04	48.09
Transportation Trucks - materials	-	-	diesel	301	-	-	24	4,080	5.47E-03	0.12	0.06	2.28E-03	2.10E-03	1.54E-04	-	45.92	5.77E-04	5.18E-05	45.95
Water Truck	-	-	diesel	304	-	-	12	1,241	4.78E-03	0.03	0.02	6.19E-04	5.70E-04	4.68E-05	-	13.96	2.03E-03	8.09E-05	14.04
Fuel Truck	-	-	diesel	304	-	-	8	827	3.19E-03	0.02	1.13E-02	4.13E-04	3.80E-04	3.12E-05	-	9.31	1.35E-03	5.39E-05	9.36
Electrical																			
Boom Truck	2270003010	150	diesel	101	12	21%	8	2,902	0.03	0.17	0.09	0.02	0.02	1.35E-04	6.34E-03	43.78	1.45E-03	1.11E-03	44.15
Fork Truck for Spool Offload	2270003020	75	diesel	109	12	59%	12	5,828	1.35E-03	0.13	1.19E-02	2.07E-03	2.01E-03	2.32E-04	3.25E-04	87.93	1.02E-04	2.24E-03	88.60
Man Lift Bucket	2270003010	150	diesel	101	12	21%	12	4,353	0.04	0.26	0.13	0.03	0.03	2.02E-04	9.51E-03	65.67	2.17E-03	1.67E-03	66.23
Trencher	2270002030	200	diesel	119	12	59%	12	13,991	0.03	0.34	0.11	0.02	0.02	6.02E-04	7.03E-03	211.07	1.96E-03	5.37E-03	212.72
Excavators / Backhoes	2270002036	150	diesel	108	12	59%	12	10,496	5.24E-03	0.11	0.03	7.92E-03	7.68E-03	4.24E-04	1.27E-03	158.35	4.41E-04	4.03E-03	159.56
Winch Truck	2270002051	250	diesel	111	12	59%	18	26,242	8.04E-03	0.09	0.02	4.14E-03	4.02E-03	1.05E-03	1.94E-03	395.89	3.64E-04	1.01E-02	398.90
Transportation Trucks - materials	-	-	diesel	301	-	-	32	5,440	7.30E-03	0.16	0.08	3.04E-03	2.79E-03	2.05E-04	-	61.22	7.70E-04	6.91E-05	61.26
Substation																			
Backhoe or Excavator	2270002036	150	diesel	108	12	59%	8	6,998	3.50E-03	0.07	0.02	5.28E-03	5.12E-03	2.83E-04	8.45E-04	105.57	2.94E-04	2.69E-03	106.38
Bulldozer	2270002069	200	diesel	107	12	59%	8	9,330	5.69E-03	0.07	0.02	5.06E-03	4.91E-03	3.79E-04	1.37E-03	140.75	3.91E-04	3.58E-03	141.83
Concrete Trucks	2270002042	150	diesel	104	12	43%	16	10,067	0.13	1.44	0.37	0.08	0.07	5.58E-04	0.03	151.87	6.51E-03	3.87E-03	153.19
Drill Rig	2270002033	100	diesel	103	12	43%	8	3,356	0.04	0.47	0.12	0.03	0.03	1.86E-04	9.83E-03	50.63	2.28E-03	1.29E-03	51.07
Man Lift Bucket	2270003010	150	diesel	101	12	21%	8	2,902	0.03	0.17	0.09	0.02	0.02	1.35E-04	6.34E-03	43.78	1.45E-03	1.11E-03	44.15
Trencher	2270002030	200	diesel	119	12	59%	8	9,327	0.02	0.23	0.07	1.47E-02	1.43E-02	4.01E-04	4.68E-03	140.71	1.30E-03	3.58E-03	141.81
Winch Truck	2270002051	250	diesel	111	12	59%	4	5,831	1.79E-03	0.02	4.57E-03	9.20E-04	8.93E-04	2.32E-04	4.30E-04	87.98	8.10E-05	2.24E-03	88.65
Cranes	2270002045	200	diesel	106	12	43%	8	6,726	7.87E-03	0.10	0.02	4.39E-03	4.26E-03	2.80E-04	1.89E-03	101.47	5.47E-04	2.58E-03	102.25
Forklifts	2270003020	75	diesel	109	12	59%	8	3,886	8.97E-04	0.09	7.96E-03	1.38E-03	1.34E-03	1.55E-04	2.17E-04	58.62	6.80E-05	1.49E-03	59.07
Skid Steer Loaders	2270002072	150	diesel	116	12	21%	4	1,447	0.04	0.19	0.12	0.02	0.02	8.02E-05	8.91E-03	21.82	1.85E-03	5.56E-04	22.03
Dump Truck (Side or belly dump)	-	-	diesel	302	-	-	16	2,845	6.09E-03	0.11	0.04	2.92E-03	2.68E-03	1.08E-04	-	32.02	7.13E-04	6.96E-05	32.06
Wind Turbine Assembly & Erection																			
Man Lift Bucket	2270003010	150	diesel	101	12	21%	40	14,511	0.13	0.86	0.45	0.09	0.09	6.74E-04	0.03	218.91	7.23E-03	5.57E-03	220.76
Forklift	2270003020	75	diesel	109	12	59%	20	9,714	0.00	0.22	0.02	3.46E-03	3.35E-03	3.87E-04	5.42E-04	146.55	1.70E-04	3.73E-03	147.67
Rough Terrain Cranes	2270002045	200	diesel	106	12	43%	50	42,036	0.05	0.60	0.14	0.03	0.03	1.75E-03	0.01	634.16	3.42E-03	0.02	639.06
Track mounted cranes	2270002045	200	diesel	106	12	43%	12	10,089	0.01	0.14	0.03	6.58E-03	6.39E-03	4.19E-04	2.84E-03	152.20	8.21E-04	3.88E-03	153.37
equip	-	-	diesel	301	-	-	252	42,838	5.75E-02	1.27	0.60	2.39E-02	0.02	1.62E-03	-	482.12	6.06E-03	5.44E-04	482.43
O&M Building																			
Excavators or Backhoes	2270002036	150	diesel	108	10	59%	12	8,747	4.37E-03	0.09	0.03	6.60E-03	6.40E-03	3.54E-04	1.06E-03	131.96	3.67E-04	3.36E-03	132.97
Forklifts	2270003020	75	diesel	109	10	59%	8	3,238	7.48E-04	0.07	6.64E-03	1.15E-03	1.12E-03	1.29E-04	1.81E-04	48.85	5.66E-05	1.24E-03	49.22
Skid Steer Loaders	2270002072	150	diesel	116	10	21%	16	4,822	0.12	0.65	0.40	0.07	0.07	2.67E-04	0.03	72.74	6.15E-03	1.85E-03	73.45
Air compressor	2270006015	50	diesel	102	10	43%	4	779	2.39E-03	0.06	1.19E-02	1.56E-03	1.52E-03	3.40E-05	5.74E-04	11.75	2.59E-04	2.99E-04	11.84
Project Cleanup																			
Front end loader	2270002060	150	diesel	115	12	59%	8	6,997	7.78E-03	0.10	0.04	8.33E-03	8.08E-03	2.89E-04	1.87E-03	105.55	6.16E-04	2.69E-03	106.37
Motor grader	2270002048	100	diesel	110	12	59%	8	4,665	3.62E-03	0.06	0.02	5.99E-03	5.81E-03	1.92E-04	8.74E-04	70.37	3.07E-04	1.79E-03	70.92
Dump Truck	-	-	diesel	302	-	-	8	1,423	3.04E-03	0.05	0.02	1.46E-03	1.34E-03	5.41E-05	-	16.01	3.57E-04	3.48E-05	16.03
Transportation Trucks - material/waste	-	-	diesel	301	-	-	12	2,040	2.74E-03	0.06	0.03	1.14E-03	1.05E-03	7.70E-05	-	22.96	2.89E-04	2.59E-05	22.97
Daily Construction Traffic																			
Full size pickups, FedEx, UPS, and other delivery trucks, etc. daily	-	-	diesel	305	-	-	1,080	67,465	0.36	2.25	2.48	0.08	0.07	2.57E-03	-	759.27	0.06	3.76E-03	761.82
Worker Commute																			
Light Commercial Truck	-	-	diesel	305	-	-	1,584	98,948	0.53	3.30	3.64	0.11	0.10	3.77E-03	-	1113.60	0.08	5.52E-03	1117.33
Passenger Car	-	-	gasoline	306	-	-	1,056	35,535	0.34	0.22	5.02	8.44E-03	7.47E-03	2.66E-03	-	399.92	0.03	6.30E-03	402.55
							Total	**675,415**	**3.03**	**24.66**	**17.83**	**1.34**	**1.29**	**0.03**	**0.40**	**9,093.78**	**0.29**	**0.17**	**9,150.72**

Notes:

1. Equipment assumptions based on information provided by the project.
2. Calculations assume equipment is used 5 days/wk - i.e., 21 days/month.
3. Calculations conservatively assume that onroad vehicles travel approximately 50 miles per day, since emission factors from the MOVES2014 model for onroad vehicles are based on miles traveled.
4. Calculations conservatively assume workers average daily round trip commute is approximately 40 miles per day, since emission factors from the MOVES2014 model for onroad vehicles are based on miles traveled.
5. Nonroad emission factors for criteria pollutants and GHG were estimated using EPA's MOVES2014b emission model for an assumed construction year of 2023.
6. Nonroad emission factors for HAPs were estimated using ERG, "Documentation for Aircraft, Commercial Marine Vessel, Locomotive, and Other Nonroad Components of the National Emissions Inventory," Volume I - Methodology, October 7, 2
7. Onroad vehicle emission factors (lb/VMT) for VOC, NOx, CO, PM10, SO2, and CO2e, were estimated using the MOVES2014b emission model for an assumed construction year of 2023.
8. Onroad vehicle emission factors for HAP were not provided with the default MOVES input files for Benton County, but are presumed to be de minimis.

								Fuel Use	Emissions										
Construction Equipment	Source Category	HP per unit	Fuel Type	Emiss. Factor ID	hrs per day	Load Factor	Total Equip. Months	gal	VOC tons	NO_X tons	CO tons	PM_{10} tons	$PM_{2.5}$ tons	SO_2 tons	HAP Tons	CO_2 tons	CH_4 tons	N_2O tons	CO_2e tons
Site Prep & Road Const																			
Bulldozer	2270002069	200	diesel	107	12	59%	20	23,325	1.42E-02	0.17	0.06	1.27E-02	1.23E-02	9.48E-04	3.43E-03	351.88	9.77E-04	8.96E-03	354.58
Excavator / Backhoe	2270002036	150	diesel	108	12	59%	20	17,494	8.74E-03	0.18	0.06	1.32E-02	1.28E-02	7.07E-04	2.11E-03	263.92	7.35E-04	6.72E-03	265.94
Loader / Skid Steer loader	2270002072	150	diesel	116	12	21%	20	7,233	0.19	0.97	0.59	0.11	0.11	4.01E-04	0.04	109.11	9.23E-03	2.78E-03	110.17
Motor grader	2270002048	100	diesel	110	12	59%	20	11,662	9.04E-03	0.15	0.06	1.50E-02	0.01	4.80E-04	2.19E-03	175.94	7.67E-04	4.48E-03	177.29
Vibratory Roller	2270002015	75	diesel	114	12	59%	15	7,284	8.68E-03	0.23	0.08	1.06E-02	1.03E-02	3.01E-04	2.09E-03	109.89	6.40E-04	2.80E-03	110.74
Dump / Belly Truck	-	-	diesel	302	-	-	60	10,670	0.02	0.40	0.17	1.09E-02	1.01E-02	4.06E-04	-	120.08	2.67E-03	2.61E-04	120.23
Water Truck	-	-	diesel	304	-	-	40	4,136	0.02	0.09	0.06	2.06E-03	1.90E-03	1.56E-04	-	46.54	6.76E-03	2.70E-04	46.79
Fuel Truck	-	-	diesel	304	-	-	10	1,034	3.99E-03	0.02	0.01	5.16E-04	4.75E-04	3.90E-05	-	11.64	1.69E-03	6.74E-05	11.70
Pile Driving (Solar)																			
Telehandler	2270003010	150	diesel	101	12	21%	15	5,442	0.05	0.32	0.17	0.03	0.03	2.53E-04	1.19E-02	82.09	2.71E-03	2.09E-03	82.78
PD10 Pile Driver	2270002081	50	diesel	112	12	59%	25	8,090	0.03	0.61	0.19	0.02	0.02	3.46E-04	6.88E-03	122.05	2.64E-03	3.11E-03	123.04
Tracked Skidsteer	2270002072	150	diesel	116	12	21%	10	3,616	0.09	0.48	0.30	0.06	0.05	2.01E-04	0.02	54.56	4.62E-03	1.39E-03	55.09
Loader Tractor	2270002066	150	diesel	118	12	21%	5	1,811	0.03	0.18	0.10	0.02	0.02	9.50E-05	7.86E-03	27.32	2.06E-03	6.96E-04	27.58
Fuel Truck	-	-	diesel	304	12	-	5	517	1.99E-03	1.15E-02	7.09E-03	2.58E-04	2.37E-04	1.95E-05	-	5.82	8.45E-04	3.37E-05	5.85
Electrical																			
Dozer	2270002069	200	diesel	107	12	59%	4	4,665	2.84E-03	0.03	1.23E-02	2.53E-03	2.46E-03	1.90E-04	6.85E-04	70.38	1.95E-04	1.79E-03	70.92
Tracked Skidsteer	2270002072	150	diesel	116	12	21%	20	7,233	0.19	0.97	0.59	0.11	0.11	4.01E-04	0.04	109.11	9.23E-03	2.78E-03	110.17
Roller	2270002015	75	diesel	114	12	59%	8	3,885	4.63E-03	0.12	0.04	5.64E-03	5.47E-03	1.61E-04	1.12E-03	58.61	3.41E-04	1.49E-03	59.06
Towable Air Compressor	2270006015	50	diesel	102	12	43%	4	934	2.86E-03	0.07	1.42E-02	1.88E-03	1.82E-03	4.07E-05	6.89E-04	14.09	3.11E-04	3.59E-04	14.21
Motor Grader	2270002048	100	diesel	110	12	59%	4	2,332	1.81E-03	0.03	1.21E-02	2.99E-03	2.90E-03	9.60E-05	4.37E-04	35.19	1.53E-04	8.96E-04	35.46
Trench Padder	2270002072	175	diesel	116	12	21%	4	1,688	0.04	0.23	0.14	0.03	0.03	9.36E-05	1.04E-02	25.46	2.15E-03	6.48E-04	25.71
Utility Tractor	2270002066	150	diesel	118	12	21%	4	1,449	0.03	0.15	0.08	0.02	0.02	7.60E-05	6.28E-03	21.85	1.65E-03	5.57E-04	22.06
Telehandler	2270003010	150	diesel	101	12	21%	8	2,902	0.03	0.17	0.09	0.02	0.02	1.35E-04	6.34E-03	43.78	1.45E-03	1.11E-03	44.15
Boom Truck	2270003010	150	diesel	101	12	21%	12	4,353	0.04	0.26	0.13	0.03	0.03	2.02E-04	9.51E-03	65.67	2.17E-03	1.67E-03	66.23
Fork Truck for Spool Offload	2270003020	75	diesel	109	12	59%	8	3,886	8.97E-04	0.09	7.96E-03	1.38E-03	1.34E-03	1.55E-04	2.17E-04	58.62	6.80E-05	1.49E-03	59.07
Man Lift Bucket	2270003010	150	diesel	101	12	21%	8	2,902	0.03	0.17	0.09	0.02	0.02	1.35E-04	6.34E-03	43.78	1.45E-03	1.11E-03	44.15
Trencher	2270002030	200	diesel	119	12	59%	8	9,327	0.02	0.23	0.07	1.47E-02	0.01	4.01E-04	4.68E-03	140.71	1.30E-03	3.58E-03	141.81
Excavators / Backhoes	2270002036	150	diesel	108	12	59%	8	6,998	3.50E-03	0.07	0.02	5.28E-03	5.12E-03	2.83E-04	8.45E-04	105.57	2.94E-04	2.69E-03	106.38
Winch Truck	2270002051	250	diesel	111	12	59%	8	11,663	3.57E-03	0.04	9.14E-03	1.84E-03	1.79E-03	4.65E-04	8.60E-04	175.95	1.62E-04	4.48E-03	177.29
Water Truck	-	-	diesel	304	-		4	414	1.59E-03	9.21E-03	5.67E-03	2.06E-04	1.90E-04	1.56E-05	-	4.65	6.76E-04	2.70E-05	4.68
Transportation Trucks - materials	-	-	diesel	301	-	-	32	5,440	7.30E-03	0.16	0.08	3.04E-03	2.79E-03	2.05E-04	-	61.22	7.70E-04	6.91E-05	61.26
Substation																			
Backhoe or Excavator	2270002036	150	diesel	108	12	59%	8	6,998	3.50E-03	0.07	0.02	5.28E-03	5.12E-03	2.83E-04	8.45E-04	105.57	2.94E-04	2.69E-03	106.38
Bulldozer	2270002069	200	diesel	107	12	59%	8	9,330	5.69E-03	0.07	0.02	5.06E-03	4.91E-03	3.79E-04	1.37E-03	140.75	3.91E-04	3.58E-03	141.83
Concrete Trucks	2270002042	150	diesel	104	12	43%	16	10,067	0.13	1.44	0.37	0.08	0.07	5.58E-04	0.03	151.87	6.51E-03	3.87E-03	153.19
Drill Rig	2270002033	100	diesel	103	12	43%	8	3,356	0.04	0.47	0.12	0.03	0.03	1.86E-04	9.83E-03	50.63	2.28E-03	1.29E-03	51.07
Man Lift Bucket	2270003010	150	diesel	101	12	21%	8	2,902	0.03	0.17	0.09	0.02	0.02	1.35E-04	6.34E-03	43.78	1.45E-03	1.11E-03	44.15
Trencher	2270002030	200	diesel	119	12	59%	8	9,327	0.02	0.23	0.07	1.47E-02	1.43E-02	4.01E-04	4.68E-03	140.71	1.30E-03	3.58E-03	141.81
Winch Truck	2270002051	250	diesel	111	12	59%	4	5,831	1.79E-03	0.02	4.57E-03	9.20E-04	8.93E-04	2.32E-04	4.30E-04	87.98	8.10E-05	2.24E-03	88.65
Cranes	2270002045	200	diesel	106	12	43%	8	6,726	7.87E-03	0.10	0.02	4.39E-03	4.26E-03	2.80E-04	1.89E-03	101.47	5.47E-04	2.58E-03	102.25
Forklifts	2270003020	75	diesel	109	12	59%	8	3,886	8.97E-04	0.09	7.96E-03	1.38E-03	1.34E-03	1.55E-04	2.17E-04	58.62	6.80E-05	1.49E-03	59.07
Skid Steer Loaders	2270002072	150	diesel	116	12	21%	4	1,447	0.04	0.19	0.12	0.02	0.02	8.02E-05	8.91E-03	21.82	1.85E-03	5.56E-04	22.03
Dump Truck (Side or belly dump)	-	-	diesel	302	-	-	16	2,845	6.09E-03	0.11	0.04	2.92E-03	2.68E-03	1.08E-04	-	32.02	7.13E-04	6.96E-05	32.06
Solar Panel Installation																			
Tracked Skidsteer	2270002072	175	diesel	116	12	21%	25	10,548	0.27	1.41	0.87	0.16	0.16	5.85E-04	0.06	159.12	1.35E-02	4.05E-03	160.67
Loader	2270002060	150	diesel	115	12	59%	5	4,373	4.86E-03	0.06	0.02	5.21E-03	5.05E-03	1.81E-04	1.17E-03	65.97	3.85E-04	1.68E-03	66.48
Telehandler	2270003010	150	diesel	101	12	21%	15	5,442	0.05	0.32	0.17	0.03	0.03	2.53E-04	1.19E-02	82.09	2.71E-03	2.09E-03	82.78
Project Cleanup																			
Telehandler	2270003010	150	diesel	101	12	21%	10	3,628	0.03	0.21	0.11	0.02	0.02	1.69E-04	7.92E-03	54.73	1.81E-03	1.39E-03	55.19
Tracked Skidsteer	2270002072	150	diesel	116	12	21%	20	7,233	0.19	0.97	0.59	0.11	0.11	4.01E-04	0.04	109.11	9.23E-03	2.78E-03	110.17
Transportation Trucks - material/waste	-	-	diesel	301	-	-	9	1,530	2.05E-03	0.05	0.02	8.54E-04	7.86E-04	5.78E-05	-	17.22	2.16E-04	1.94E-05	17.23
Daily Construction Traffic																			
Full size pickups, FedEx, UPS, and other delivery trucks, etc. daily	-	-	diesel	305	-	-	900	56,221	0.30	1.88	2.07	0.06	0.06	2.14E-03	-	632.73	0.05	3.14E-03	634.85
Buggies	-	-	gasoline	306	-	-	384	12,922	0.12	0.08	1.83	3.07E-03	2.72E-03	9.66E-04	-	145.43	1.09E-02	2.29E-03	146.38
Busses	-	-	diesel	303	-	-	72	6,857	0.01	0.14	0.09	3.08E-03	2.84E-03	2.59E-04	-	77.17	1.75E-03	2.61E-04	77.30
							Total	**343,847**	**2.12**	**14.67**	**9.94**	**1.15**	**1.11**	**0.02**	**0.39**	**4,794.30**	**0.16**	**0.10**	**4,827.91**

Notes:
1. Equipment assumptions based on information provided by the project.
2. Calculations assume equipment is used 5 days/wk - i.e 21 days/month.
3. Calculations conservatively assume that onroad vehicles travel approximately 50 miles per day, since emission factors from the MOVES2014 model for onroad vehicles are based on miles traveled.
4. Calculations conservatively assume workers average daily round trip commute is approximately 40 miles per day, since emission factors from the MOVES2014 model for onroad vehicles are based on miles traveled.
5. Nonroad emission factors for criteria pollutants and GHG were estimated using EPA's MOVES2014b emission model for an assumed construction year of 2023.
6. Nonroad emission factors for HAPs were estimated using ERG, "Documentation for Aircraft, Commercial Marine Vessel, Locomotive, and Other Nonroad Components of the National Emissions Inventory," Volume I - Methodology, October
7. Onroad vehicle emission factors (lb/VMT) for VOC, NOx, CO, PM10, SO2, and CO2e, were estimated using the MOVES2014b emission model for an assumed construction year of 2023.
8. Onroad vehicle emission factors for HAP were not provided with the default MOVES input files for Benton County, but are presumed to be de minimis.

Horse Heaven Wind Farm - Construction Emissions
Phase 1 Battery (150 MW)

Construction Equipment	Source Category	HP per unit	Fuel Type	Emiss. Factor ID	hrs per day	Load Factor	Total Equip. Months	Fuel Use gal	Emissions VOC tons	NO_X tons	CO tons	PM_{10} tons	$PM_{2.5}$ tons	SO_2 tons	HAP Tons	CO_2 tons	CH_4 tons	N_2O tons	CO_2e tons
Site Prep & Road Const																			
Bulldozer	2270002069	200	diesel	107	12	59%	4	4,665	2.84E-03	0.03	1.23E-02	2.53E-03	2.46E-03	1.90E-04	6.85E-04	70.38	1.95E-04	1.79E-03	70.92
Excavator / Backhoe	2270002036	150	diesel	108	12	59%	4	3,499	1.75E-03	0.04	1.14E-02	2.64E-03	2.56E-03	1.41E-04	4.22E-04	52.78	1.47E-04	1.34E-03	53.19
Loader / Skid Steer loader	2270002072	150	diesel	116	12	21%	2	723	0.02	0.10	0.06	1.12E-02	1.08E-02	4.01E-05	4.46E-03	10.91	9.23E-04	2.78E-04	11.02
Motor grader	2270002048	100	diesel	110	12	59%	2	1,166	9.04E-04	1.49E-02	6.04E-03	1.50E-03	1.45E-03	4.80E-05	2.19E-04	17.59	7.67E-05	4.48E-04	17.73
Vibratory Roller	2270002015	75	diesel	114	12	59%	2	971	1.16E-03	0.03	1.10E-02	1.41E-03	1.37E-03	4.01E-05	2.79E-04	14.65	8.53E-05	3.73E-04	14.77
Dump / Belly Truck	-	-	diesel	302	-	-	4	711	1.52E-03	0.03	1.11E-02	7.29E-04	6.71E-04	2.71E-05	-	8.01	1.78E-04	1.74E-05	8.02
Water Truck	-	-	diesel	304	-	-	2	207	7.97E-04	4.60E-03	2.84E-03	1.03E-04	9.50E-05	7.80E-06	-	2.33	3.38E-04	1.35E-05	2.34
Fuel Truck	-	-	diesel	304	-	-	2	207	7.97E-04	4.60E-03	2.84E-03	1.03E-04	9.50E-05	7.80E-06	-	2.33	3.38E-04	1.35E-05	2.34
Foundation																			
Rough Terrain Cranes	2270002045	200	diesel	106	12	43%	2	1,681	1.97E-03	0.02	5.50E-03	1.10E-03	1.06E-03	6.99E-05	4.73E-04	25.37	1.37E-04	6.46E-04	25.56
Concrete Truck	2270002042	150	diesel	104	12	43%	8	5,034	0.06	0.72	0.19	0.04	0.04	2.79E-04	0.02	75.94	3.25E-03	1.93E-03	76.59
Backhoe or Excavator	2270002036	150	diesel	108	12	59%	4	3,499	1.75E-03	0.04	1.14E-02	2.64E-03	2.56E-03	1.41E-04	4.22E-04	52.78	1.47E-04	1.34E-03	53.19
Forklifts	2270003020	75	diesel	109	12	59%	4	1,943	4.49E-04	0.04	3.98E-03	6.91E-04	6.71E-04	7.74E-05	1.08E-04	29.31	3.40E-05	7.46E-04	29.53
Skid Steer loader	2270002072	150	diesel	116	12	21%	2	723	0.02	0.10	0.06	1.12E-02	1.08E-02	4.01E-05	4.46E-03	10.91	9.23E-04	2.78E-04	11.02
Dump Truck	-	-	diesel	302	-	-	4	711	1.52E-03	0.03	1.11E-02	7.29E-04	6.71E-04	2.71E-05	-	8.01	1.78E-04	1.74E-05	8.02
Transportation Trucks - materials	-	-	diesel	301	-	-	4	680	9.12E-04	0.02	9.58E-03	3.80E-04	3.49E-04	2.57E-05	-	7.65	9.62E-05	8.63E-06	7.66
Water Truck	-	-	diesel	304	-	-	2	207	7.97E-04	4.60E-03	2.84E-03	1.03E-04	9.50E-05	7.80E-06	-	2.33	3.38E-04	1.35E-05	2.34
Fuel Truck	-	-	diesel	304	-	-	2	207	7.97E-04	4.60E-03	2.84E-03	1.03E-04	9.50E-05	7.80E-06	-	2.33	3.38E-04	1.35E-05	2.34
Electrical																			
Boom Truck	2270003010	150	diesel	101	12	21%	2	726	6.59E-03	0.04	0.02	4.45E-03	4.32E-03	3.37E-05	1.58E-03	10.95	3.62E-04	2.79E-04	11.04
Fork Truck for Spool Offload	2270003020	75	diesel	109	12	59%	2	971	2.24E-04	0.02	1.99E-03	3.46E-04	3.35E-04	3.87E-05	5.42E-05	14.65	1.70E-05	3.73E-04	14.77
Man Lift Bucket	2270003010	150	diesel	101	12	21%	2	726	6.59E-03	0.04	0.02	4.45E-03	4.32E-03	3.37E-05	1.58E-03	10.95	3.62E-04	2.79E-04	11.04
Trencher	2270002030	200	diesel	119	12	59%	2	2,332	4.87E-03	0.06	0.02	3.67E-03	3.56E-03	1.00E-04	1.17E-03	35.18	3.26E-04	8.96E-04	35.45
Excavators / Backhoes	2270002036	150	diesel	108	12	59%	2	1,749	8.74E-04	0.02	5.72E-03	1.32E-03	1.28E-03	7.07E-05	2.11E-04	26.39	7.35E-05	6.72E-04	26.59
Transportation Trucks - materials	-	-	diesel	301	-	-	4	680	9.12E-04	0.02	9.58E-03	3.80E-04	3.49E-04	2.57E-05	-	7.65	9.62E-05	8.63E-06	7.66
Project Cleanup																			
Front end loader	2270002060	150	diesel	115	12	59%	1	875	9.72E-04	1.22E-02	4.79E-03	1.04E-03	1.01E-03	3.61E-05	2.34E-04	13.19	7.69E-05	3.36E-04	13.30
Motor grader	2270002048	100	diesel	110	12	59%	1	583	4.52E-04	7.43E-03	3.02E-03	7.49E-04	7.26E-04	2.40E-05	1.09E-04	8.80	3.84E-05	2.24E-04	8.86
Dump Truck	-	-	diesel	302	-	-	1	178	3.80E-04	6.63E-03	2.79E-03	1.82E-04	1.68E-04	6.76E-06	-	2.00	4.46E-05	4.35E-06	2.00
Transportation Trucks - material/waste	-	-	diesel	301	-	-	1	170	2.28E-04	5.05E-03	2.39E-03	9.49E-05	8.73E-05	6.42E-06	-	1.91	2.41E-05	2.16E-06	1.91
Daily Construction Traffic																			
Full size pickups, FedEx, UPS, and other delivery trucks, etc. daily	-	-	diesel	305	-	-	400	24,987	0.13	0.83	0.92	0.03	0.03	9.53E-04	-	281.21	0.02	1.39E-03	282.16
							Total	**60,810**	**0.27**	**2.29**	**1.42**	**0.12**	**0.11**	**2.51E-03**	**0.03**	**806.49**	**0.03**	**1.37E-02**	**811.34**

Notes:

1. Equipment assumptions based on information provided by the project.
2. Calculations assume equipment is used 5 days/wk - i.e., 21 days/month.
3. Calculations conservatively assume that onroad vehicles travel approximately 50 miles per day, since emission factors from the MOVES2014 model for onroad vehicles are based on miles traveled.
4. Calculations conservatively assume workers average daily round trip commute is approximately 40 miles per day, since emission factors from the MOVES2014 model for onroad vehicles are based on miles traveled.
5. Nonroad emission factors for criteria pollutants and GHG were estimated using EPA's MOVES2014b emission model for an assumed construction year of 2023.
6. Nonroad emission factors for HAPs were estimated using ERG, "Documentation for Aircraft, Commercial Marine Vessel, Locomotive, and Other Nonroad Components of the National Emissions Inventory," Volume I - Methodology, October 7, 2
7. Onroad vehicle emission factors (lb/VMT) for VOC, NOx, CO, PM10, SO2, and CO2e, were estimated using the MOVES2014b emission model for an assumed construction year of 2023.
8. Onroad vehicle emission factors for HAP were not provided with the default MOVES input files for Benton County, but are presumed to be de minimis.

Horse Heaven Wind Farm - Construction Emissions
Phase 2a Wind (250 MW)

								Fuel Use	Emissions										
Construction Equipment	**Source Category**	**HP per unit**	**Fuel Type**	**Emiss. Factor ID**	**hrs per day**	**Load Factor**	**Total Equip. Months**	**gal**	**VOC tons**	**NO_X tons**	**CO tons**	**PM_{10} tons**	**$PM_{2.5}$ tons**	**SO_2 tons**	**HAP Tons**	**CO_2 tons**	**CH_4 tons**	**N_2O tons**	**CO_2e tons**
Site Prep & Road Const																			
Bulldozer	2270002069	200	diesel	207	12	59%	32	37,320	0.02	0.22	0.07	1.43E-02	1.39E-02	1.50E-03	4.34E-03	563.02	1.13E-03	1.43E-02	567.33
Excavator / Backhoe	2270002036	150	diesel	208	12	59%	32	27,991	1.09E-02	0.23	0.07	0.02	1.47E-02	1.12E-03	2.62E-03	422.28	8.82E-04	1.08E-02	425.50
Loader / Skid Steer loader	2270002072	150	diesel	216	12	21%	32	11,573	0.29	1.53	0.94	0.18	0.17	6.42E-04	0.07	174.59	0.02	4.45E-03	176.30
Motor grader	2270002048	100	diesel	210	12	59%	32	18,660	1.02E-02	0.18	0.07	0.02	0.02	7.57E-04	2.46E-03	281.51	8.44E-04	7.17E-03	283.67
Vibratory Roller	2270002015	75	diesel	214	12	59%	24	11,655	1.02E-02	0.33	0.10	1.34E-02	1.30E-02	4.77E-04	2.47E-03	175.84	7.92E-04	4.48E-03	177.19
Dump / Belly Truck	-	-	diesel	402	-	-	96	16,839	0.03	0.59	0.26	1.44E-02	1.33E-02	6.39E-04	-	189.51	4.20E-03	4.17E-04	189.74
Water Truck	-	-	diesel	404	-	-	64	6,497	0.02	0.14	0.09	2.81E-03	2.58E-03	2.45E-04	-	73.12	1.08E-02	4.31E-04	73.52
Fuel Truck	-	-	diesel	404	-	-	16	1,624	6.06E-03	0.03	0.02	7.01E-04	6.45E-04	6.12E-05	-	18.28	2.70E-03	1.08E-04	18.38
Foundation																			
Rough Terrain Cranes	2270002045	200	diesel	206	12	43%	12	10,089	9.11E-03	0.11	0.03	5.07E-03	4.92E-03	4.14E-04	2.19E-03	152.21	6.27E-04	3.88E-03	153.38
Concrete pump truck	2270002042	200	diesel	205	12	43%	8	6,713	0.07	0.89	0.22	0.04	0.04	3.72E-04	0.02	101.28	3.78E-03	2.58E-03	102.14
Concrete Truck	2270002042	150	diesel	204	12	43%	64	40,269	0.50	5.69	1.47	0.30	0.29	2.23E-03	0.12	607.51	0.03	0.02	612.79
Backhoe or Excavator	2270002036	150	diesel	208	12	59%	16	13,995	5.43E-03	0.12	0.03	7.55E-03	7.33E-03	5.62E-04	1.31E-03	211.14	4.41E-04	5.38E-03	212.75
Forklifts	2270003020	75	diesel	209	12	59%	12	5,828	1.19E-03	0.13	9.02E-03	1.62E-03	1.57E-03	2.32E-04	2.88E-04	87.93	8.72E-05	2.24E-03	88.60
Skid Steer loader	2270002072	150	diesel	216	12	21%	8	2,893	0.07	0.38	0.23	0.04	0.04	1.60E-04	0.02	43.65	3.78E-03	1.11E-03	44.07
Dump Truck	-	-	diesel	402	-	-	24	4,210	8.02E-03	0.15	0.06	3.61E-03	3.32E-03	1.60E-04	-	47.38	1.05E-03	1.04E-04	47.43
Transportation Trucks - materials	-	-	diesel	401	-	-	24	3,993	5.07E-03	0.11	0.06	1.98E-03	1.83E-03	1.51E-04	-	44.94	5.54E-04	5.18E-05	44.97
Water Truck	-	-	diesel	404	-	-	12	1,218	4.55E-03	0.03	0.02	5.26E-04	4.84E-04	4.59E-05	-	13.71	2.02E-03	8.08E-05	13.79
Fuel Truck	-	-	diesel	404	-	-	8	812	3.03E-03	0.02	1.10E-02	3.51E-04	3.23E-04	3.06E-05	-	9.14	1.35E-03	5.39E-05	9.19
Electrical																			
Boom Truck	2270003010	150	diesel	201	12	21%	8	2,903	0.02	0.16	0.08	0.02	0.02	1.33E-04	5.78E-03	43.79	1.36E-03	1.12E-03	44.16
Fork Truck for Spool Offload	2270003020	75	diesel	209	12	59%	12	5,828	1.19E-03	0.13	9.02E-03	1.62E-03	1.57E-03	2.32E-04	2.88E-04	87.93	8.72E-05	2.24E-03	88.60
Man Lift Bucket	2270003010	150	diesel	201	12	21%	12	4,354	0.04	0.24	0.12	0.02	0.02	2.00E-04	8.67E-03	65.68	2.04E-03	1.67E-03	66.23
Trencher	2270002030	200	diesel	219	12	59%	12	13,992	0.02	0.29	0.09	0.02	0.02	5.93E-04	5.88E-03	211.08	1.64E-03	5.38E-03	212.73
Excavators / Backhoes	2270002036	150	diesel	208	12	59%	12	10,497	4.07E-03	0.09	0.03	5.66E-03	5.49E-03	4.21E-04	9.84E-04	158.35	3.31E-04	4.03E-03	159.56
Winch Truck	2270002051	250	diesel	211	12	59%	8	11,663	3.34E-03	0.04	0.01	1.56E-03	1.51E-03	4.64E-04	8.05E-04	175.95	1.41E-04	4.48E-03	177.29
Transportation Trucks - materials	-	-	diesel	401	-	-	32	5,324	6.76E-03	0.15	0.07	2.65E-03	2.43E-03	2.01E-04	-	59.91	7.39E-04	6.91E-05	59.95
Substation																			
Backhoe or Excavator	2270002036	150	diesel	208	12	59%	20	17,494	6.79E-03	0.14	0.04	9.44E-03	9.16E-03	7.02E-04	1.64E-03	263.92	5.52E-04	6.72E-03	265.94
Bulldozer	2270002069	200	diesel	207	12	59%	20	23,325	1.13E-02	0.13	0.04	8.96E-03	8.69E-03	9.40E-04	2.71E-03	351.89	7.09E-04	8.96E-03	354.58
Concrete Trucks	2270002042	150	diesel	204	12	43%	40	25,168	0.31	3.56	0.92	0.19	0.18	1.40E-03	0.07	379.70	0.02	9.67E-03	382.99
Drill Rig	2270002033	100	diesel	203	12	43%	20	8,390	0.10	1.14	0.29	0.07	0.06	4.63E-04	0.02	126.58	5.67E-03	3.22E-03	127.68
Man Lift Bucket	2270003010	150	diesel	201	12	21%	20	7,256	0.06	0.39	0.20	0.04	0.04	3.34E-04	1.44E-02	109.47	3.40E-03	2.79E-03	110.39
Trencher	2270002030	200	diesel	219	12	59%	20	23,320	0.04	0.48	0.15	0.03	0.03	9.89E-04	9.81E-03	351.81	2.73E-03	8.96E-03	354.55
Winch Truck	2270002051	250	diesel	211	12	59%	10	14,579	4.18E-03	0.05	9.67E-03	1.95E-03	1.89E-03	5.80E-04	1.01E-03	219.94	1.76E-04	5.60E-03	221.61
Cranes	2270002045	200	diesel	206	12	43%	20	16,815	0.02	0.18	0.04	8.45E-03	8.19E-03	6.91E-04	3.65E-03	253.68	1.05E-03	6.46E-03	255.63
Forklifts	2270003020	75	diesel	209	12	59%	20	9,714	1.98E-03	0.21	0.02	2.70E-03	2.62E-03	3.86E-04	4.79E-04	146.55	1.45E-04	3.73E-03	147.67
Skid Steer Loaders	2270002072	150	diesel	216	12	21%	10	3,617	0.09	0.48	0.29	0.06	0.05	2.01E-04	0.02	54.56	4.73E-03	1.39E-03	55.09
Dump Truck (Side or belly dump)	-	-	diesel	402	-	-	40	7,016	1.34E-02	0.24	0.11	6.02E-03	5.54E-03	2.66E-04	-	78.96	1.75E-03	1.74E-04	79.06
Wind Turbine Assembly & Erection																			
Man Lift Bucket	2270003010	150	diesel	201	12	21%	40	14,513	0.12	0.79	0.41	0.08	0.08	6.67E-04	0.03	218.95	6.81E-03	5.58E-03	220.78
Forklift	2270003020	75	diesel	209	12	59%	20	9,714	1.98E-03	0.21	0.02	2.70E-03	2.62E-03	3.86E-04	4.79E-04	146.55	1.45E-04	3.73E-03	147.67
Rough Terrain Cranes	2270002045	200	diesel	206	12	43%	50	42,038	0.04	0.46	0.11	0.02	0.02	1.73E-03	9.13E-03	634.19	2.61E-03	0.02	639.07
Track mounted cranes	2270002045	200	diesel	206	12	43%	12	10,089	9.11E-03	0.11	0.03	5.07E-03	4.92E-03	4.14E-04	2.19E-03	152.21	6.27E-04	3.88E-03	153.38
Transportation Trucks - materials & equi	-	-	diesel	401	-	-	252	41,924	5.32E-02	1.19	0.58	0.02	0.02	1.58E-03	-	471.83	5.82E-03	5.44E-04	472.13
Transmission Line																			
Cranes	2270002045	200	diesel	206	8	43%	8	4,484	4.05E-03	0.05	1.14E-02	2.25E-03	2.18E-03	1.84E-04	9.74E-04	67.65	2.79E-04	1.72E-03	68.17
Bucket Trucks	2270003010	150	diesel	201	8	21%	20	4,838	0.04	0.26	0.14	0.03	0.03	2.22E-04	9.63E-03	72.98	2.27E-03	1.86E-03	73.59
Wire Pullers	2270002081	100	diesel	213	6	59%	6	1,749	3.26E-03	0.04	1.35E-02	2.86E-03	2.78E-03	7.38E-05	7.86E-04	26.38	2.38E-04	6.72E-04	26.59
Wire Tensioners	2270002081	100	diesel	213	6	59%	6	1,749	3.26E-03	0.04	1.35E-02	2.86E-03	2.78E-03	7.38E-05	7.86E-04	26.38	2.38E-04	6.72E-04	26.59
Excavators or Backhoes	2270002036	150	diesel	208	4	59%	18	5,248	2.04E-03	0.04	1.31E-02	2.83E-03	2.75E-03	2.11E-04	4.92E-04	79.18	1.65E-04	2.02E-03	79.78
Forklifts	2270003020	75	diesel	209	4	59%	12	1,943	3.97E-04	0.04	3.01E-03	5.41E-04	5.25E-04	7.73E-05	9.59E-05	29.31	2.91E-05	7.46E-04	29.53
Truck / track diggers	2270002036	150	diesel	208	6	59%	4	1,749	6.79E-04	1.45E-02	4.35E-03	9.44E-04	9.16E-04	7.02E-05	1.64E-04	26.39	5.52E-05	6.72E-04	26.59
Dozers	2270002069	200	diesel	207	4	59%	5	1,944	9.39E-04	1.12E-02	3.64E-03	7.47E-04	7.24E-04	7.83E-05	2.26E-04	29.32	5.91E-05	7.47E-04	29.55
UTVs	2270001060	75	diesel	217	2	21%	6	201	2.68E-03	0.02	1.32E-02	1.79E-03	1.74E-03	9.71E-06	6.44E-04	3.04	1.07E-04	7.73E-05	3.06
Tractor	2270002066	150	diesel	218	6	21%	4	725	1.13E-02	0.06	0.04	7.33E-03	7.11E-03	3.68E-05	2.72E-03	10.93	7.19E-04	2.78E-04	11.03
Skid Steer Loaders	2270002072	150	diesel	216	6	21%	12	2,170	0.05	0.29	0.18	0.03	0.03	1.20E-04	1.32E-02	32.74	2.84E-03	8.34E-04	33.06
Underground boring equipment	2270002033	100	diesel	203	8	43%	12	3,356	0.04	0.45	0.12	0.03	0.03	1.85E-04	9.55E-03	50.63	2.27E-03	1.29E-03	51.07
Tractor Trailers	-	-	diesel	401	-	-	6	998	1.27E-03	0.03	1.39E-02	4.96E-04	4.56E-04	3.76E-05	-	11.23	1.39E-04	1.30E-05	11.24
Fuel Trucks / Trailers	-	-	diesel	404	-	-	6	609	2.27E-03	1.29E-02	8.23E-03	2.63E-04	2.42E-04	2.30E-05	-	6.86	1.01E-03	4.04E-05	6.89
O&M Building																			
Excavators or Backhoes	2270002036	150	diesel	208	10	59%	12	8,747	3.39E-03	0.07	0.02	4.72E-03	4.58E-03	3.51E-04	8.20E-04	131.96	2.76E-04	3.36E-03	132.97
Forklifts	2270003020	75	diesel	209	10	59%	8	3,238	6.61E-04	0.07	5.01E-03	9.01E-04	8.74E-04	1.29E-04	1.60E-04	48.85	4.85E-05	1.24E-03	49.22
Skid Steer Loaders	2270002072	150	diesel	216	10	21%	16	4,822	0.12	0.64	0.39	0.07	0.07	2.67E-04	0.03	72.75	6.31E-03	1.85E-03	73.46
Air compressor	2270006015	50	diesel	202	10	43%	4	779	2.14E-03	0.06	1.04E-02	1.32E-03	1.28E-03	3.34E-05	5.14E-04	11.75	2.47E-04	2.99E-04	11.84
Project Cleanup																			
Front end loader	2270002060	150	diesel	215	12	59%	8	6,997	5.91E-03	0.08	0.03	6.87E-03	6.66E-03	2.86E-04	1.43E-03	105.56	4.68E-04	2.69E-03	106.37
Motor grader	2270002048	100	diesel	210	12	59%	8	4,665	2.55E-03	0.04	0.02	3.95E-03	3.84E-03	1.89E-04	6.16E-04	70.38	2.11E-04	1.79E-03	70.92
Dump Truck	-	-	diesel	402	-	-	8	1,403	2.67E-03	0.05	0.02	1.20E-03	1.11E-03	5.32E-05	-	15.79	3.50E-04	3.48E-05	15.81
Transportation Trucks - material/waste	-	-	diesel	401	-	-	12	1,996	2.53E-03	0.06	0.03	9.92E-04	9.13E-04	7.53E-05	-	22.47	2.77E-04	2.59E-05	22.48
Daily Construction Traffic																			
Full size pickups, FedEx, UPS, and other delivery trucks, etc. daily	-	-	diesel	405	-	-	1,400	84,833	0.41	2.58	2.79	0.09	0.09	3.23E-03	-	954.75	0.07	4.88E-03	958.05
Worker Commute																			
Light Commercial Truck	-	-	diesel	405	-	-	1,412	85,560	0.41	2.60	2.82	0.10	0.09	3.26E-03	-	962.93	0.07	4.92E-03	966.26
Passenger Car	-	-	gasoline	406	-	-	942	30,938	0.28	0.16	4.33	7.47E-03	6.61E-03	2.31E-03	-	348.19	0.02	5.36E-03	350.41
							Total	**817,455**	**3.47**	**29.48**	**18.44**	**1.68**	**1.62**	**0.04**	**0.53**	**11,198.93**	**0.33**	**0.22**	**11,272.03**

Notes:

1. Equipment assumptions based on information provided by the project.
2. Calculations assume equipment is used 5 days/wk - i.e., 21 days/month.
3. Calculations conservatively assume that onroad vehicles travel approximately 50 miles per day, since emission factors from the MOVES2014 model for onroad vehicles are based on miles traveled.
4. Calculations conservatively assume workers average daily round trip commute is approximately 40 miles per day, since emission factors from the MOVES2014 model for onroad vehicles are based on miles traveled.
5. Nonroad emission factors for criteria pollutants and GHG were estimated using EPA's MOVES2014b emission model for an assumed construction year of 2024.
6. Nonroad emission factors for HAPs were estimated using ERG, "Documentation for Aircraft, Commercial Marine Vessel, Locomotive, and Other Nonroad Components of the National Emissions Inventory," Volume I - Methodology, October 7, 2
7. Onroad vehicle emission factors (lb/VMT) for VOC, NOx, CO, PM10, SO2, and CO2e, were estimated using the MOVES2014b emission model for an assumed construction year of 2024.
8. Onroad vehicle emission factors for HAP were not provided with the default MOVES input files for Benton County, but are presumed to be de minimis.

Horse Heaven Wind Farm - Construction Emissions
Phase 2a Solar (250 MW)

								Fuel Use	Emissions										
Construction Equipment	Source Category	HP per unit	Fuel Type	Emiss. Factor ID	hrs per day	Load Factor	Total Equip. Months	gal	VOC tons	NO_X tons	CO tons	PM_{10} tons	$PM_{2.5}$ tons	SO_2 tons	HAP Tons	CO_2 tons	CH_4 tons	N_2O tons	CO_2e tons
Site Prep & Road Const																			
Bulldozer	2270002069	200	diesel	207	12	59%	16	18,660	9.01E-03	0.11	0.03	7.17E-03	6.95E-03	7.52E-04	2.17E-03	281.51	5.67E-04	7.17E-03	283.66
Excavator / Backhoe	2270002036	150	diesel	208	12	59%	16	13,995	5.43E-03	0.12	0.03	7.55E-03	7.33E-03	5.62E-04	1.31E-03	211.14	4.41E-04	5.38E-03	212.75
Loader / Skid Steer loader	2270002072	150	diesel	216	12	21%	16	5,787	0.15	0.76	0.47	0.09	0.09	3.21E-04	0.04	87.30	7.57E-03	2.22E-03	88.15
Motor grader	2270002048	100	diesel	210	12	59%	16	9,330	5.10E-03	0.09	0.03	7.91E-03	7.67E-03	3.78E-04	1.23E-03	140.75	4.22E-04	3.58E-03	141.83
Vibratory Roller	2270002015	75	diesel	214	12	59%	12	5,828	5.11E-03	0.17	0.05	6.72E-03	6.52E-03	2.38E-04	1.23E-03	87.92	3.96E-04	2.24E-03	88.60
Dump / Belly Truck	-	-	diesel	402	-	-	48	8,419	0.02	0.29	0.13	7.22E-03	6.64E-03	3.19E-04	-	94.76	2.10E-03	2.09E-04	94.87
Water Truck	-	-	diesel	404	-	-	32	3,249	1.21E-02	0.07	0.04	1.40E-03	1.29E-03	1.22E-04	-	36.56	5.39E-03	2.15E-04	36.76
Fuel Truck	-	-	diesel	404	-	-	8	812	3.03E-03	0.02	1.10E-02	3.51E-04	3.23E-04	3.06E-05	-	9.14	1.35E-03	5.39E-05	9.19
Pile Driving (Solar)																			
Telehandler	2270003010	150	diesel	201	12	21%	15	5,442	0.05	0.29	0.15	0.03	0.03	2.50E-04	1.08E-02	82.11	2.55E-03	2.09E-03	82.79
PD10 Pile Driver	2270002081	50	diesel	212	12	59%	25	8,090	0.03	0.59	0.16	0.02	0.02	3.42E-04	6.04E-03	122.06	2.50E-03	3.11E-03	123.04
Tracked Skidsteer	2270002072	150	diesel	216	12	21%	10	3,617	0.09	0.48	0.29	0.06	0.05	2.01E-04	0.02	54.56	4.73E-03	1.39E-03	55.09
Loader Tractor	2270002066	150	diesel	218	12	21%	5	1,812	0.03	0.16	0.09	0.02	0.02	9.21E-05	6.79E-03	27.33	1.80E-03	6.96E-04	27.58
Fuel Truck	-	-	diesel	404	-	-	5	508	1.89E-03	1.08E-02	6.86E-03	2.19E-04	2.02E-04	1.91E-05	-	5.71	8.43E-04	3.37E-05	5.74
Electrical																			
Dozer	2270002069	200	diesel	207	12	59%	4	4,665	2.25E-03	0.03	8.73E-03	1.79E-03	1.74E-03	1.88E-04	5.43E-04	70.38	1.42E-04	1.79E-03	70.92
Tracked Skidsteer	2270002072	150	diesel	216	12	21%	20	7,233	0.18	0.96	0.58	0.11	0.11	4.01E-04	0.04	109.12	9.46E-03	2.78E-03	110.19
Roller	2270002015	75	diesel	214	12	59%	8	3,885	3.41E-03	0.11	0.03	4.48E-03	4.34E-03	1.59E-04	8.22E-04	58.61	2.64E-04	1.49E-03	59.06
Towable Air Compressor	2270006015	50	diesel	202	12	43%	4	934	2.56E-03	0.07	1.25E-02	1.59E-03	1.54E-03	4.00E-05	6.16E-04	14.10	2.96E-04	3.59E-04	14.21
Motor Grader	2270002048	100	diesel	210	12	59%	4	2,332	1.27E-03	0.02	8.38E-03	1.98E-03	1.92E-03	9.46E-05	3.08E-04	35.19	1.05E-04	8.96E-04	35.46
Trench Padder	2270002072	175	diesel	216	12	21%	4	1,688	0.04	0.22	0.14	0.03	0.02	9.36E-05	1.03E-02	25.46	2.21E-03	6.48E-04	25.71
Utility Tractor	2270002066	150	diesel	218	12	21%	4	1,449	0.02	0.13	0.07	1.47E-02	1.42E-02	7.37E-05	5.43E-03	21.86	1.44E-03	5.57E-04	22.07
Telehandler	2270003010	150	diesel	201	12	21%	8	2,903	0.02	0.16	0.08	0.02	0.02	1.33E-04	5.78E-03	43.79	1.36E-03	1.12E-03	44.16
Boom Truck	2270003010	150	diesel	201	12	21%	12	4,354	0.04	0.24	0.12	0.02	0.02	2.00E-04	8.67E-03	65.68	2.04E-03	1.67E-03	66.23
Fork Truck for Spool Offload	2270003020	75	diesel	209	12	59%	8	3,886	7.93E-04	0.08	6.01E-03	1.08E-03	1.05E-03	1.55E-04	1.92E-04	58.62	5.81E-05	1.49E-03	59.07
Man Lift Bucket	2270003010	150	diesel	201	12	21%	8	2,903	0.02	0.16	0.08	0.02	0.02	1.33E-04	5.78E-03	43.79	1.36E-03	1.12E-03	44.16
Trencher	2270002030	200	diesel	219	12	59%	8	9,328	0.02	0.19	0.06	1.21E-02	1.17E-02	3.96E-04	3.92E-03	140.72	1.09E-03	3.58E-03	141.82
Excavators / Backhoes	2270002036	150	diesel	208	12	59%	8	6,998	2.72E-03	0.06	0.02	3.78E-03	3.66E-03	2.81E-04	6.56E-04	105.57	2.21E-04	2.69E-03	106.38
Winch Truck	2270002051	250	diesel	211	12	59%	12	17,494	5.02E-03	0.06	1.16E-02	2.34E-03	2.27E-03	6.96E-04	1.21E-03	263.93	2.11E-04	6.72E-03	265.94
Water Truck	-	-	diesel	404	-	-	4	406	1.52E-03	8.61E-03	5.49E-03	1.75E-04	1.61E-04	1.53E-05	-	4.57	6.74E-04	2.69E-05	4.60
Transportation Trucks - materials	-	-	diesel	401	-	-	32	5,324	6.76E-03	0.15	0.07	2.65E-03	2.43E-03	2.01E-04	-	59.91	7.39E-04	6.91E-05	59.95
Substation																			
Backhoe or Excavator	2270002036	150	diesel	208	12	59%	8	6,998	2.72E-03	0.06	0.02	3.78E-03	3.66E-03	2.81E-04	6.56E-04	105.57	2.21E-04	2.69E-03	106.38
Bulldozer	2270002069	200	diesel	207	12	59%	8	9,330	4.50E-03	0.05	0.02	3.58E-03	3.48E-03	3.76E-04	1.09E-03	140.76	2.83E-04	3.58E-03	141.83
Concrete Trucks	2270002042	150	diesel	204	12	43%	16	10,067	0.12	1.42	0.37	0.08	0.07	5.58E-04	0.03	151.88	6.67E-03	3.87E-03	153.20
Drill Rig	2270002033	100	diesel	203	12	43%	8	3,356	0.04	0.45	0.12	0.03	0.03	1.85E-04	9.55E-03	50.63	2.27E-03	1.29E-03	51.07
Man Lift Bucket	2270003010	150	diesel	201	12	21%	8	2,903	0.02	0.16	0.08	0.02	0.02	1.33E-04	5.78E-03	43.79	1.36E-03	1.12E-03	44.16
Trencher	2270002030	200	diesel	219	12	59%	8	9,328	0.02	0.19	0.06	1.21E-02	1.17E-02	3.96E-04	3.92E-03	140.72	1.09E-03	3.58E-03	141.82
Winch Truck	2270002051	250	diesel	211	12	59%	4	5,831	1.67E-03	0.02	3.87E-03	7.79E-04	7.56E-04	2.32E-04	4.02E-04	87.98	7.03E-05	2.24E-03	88.65
Cranes	2270002045	200	diesel	206	12	43%	8	6,726	6.08E-03	0.07	0.02	3.38E-03	3.28E-03	2.76E-04	1.46E-03	101.47	4.18E-04	2.58E-03	102.25
Forklifts	2270003020	75	diesel	209	12	59%	8	3,886	7.93E-04	0.08	6.01E-03	1.08E-03	1.05E-03	1.55E-04	1.92E-04	58.62	5.81E-05	1.49E-03	59.07
Skid Steer Loaders	2270002072	150	diesel	216	12	21%	4	1,447	0.04	0.19	0.12	0.02	0.02	8.02E-05	8.79E-03	21.82	1.89E-03	5.56E-04	22.04
Dump Truck (Side or belly dump)	-	-	diesel	402	-	-	16	2,806	5.35E-03	0.10	0.04	2.41E-03	2.21E-03	1.06E-04	-	31.59	7.00E-04	6.95E-05	31.62
Solar Panel Installation																			
Tracked Skidsteer	2270002072	175	diesel	216	12	21%	25	10,548	0.27	1.39	0.85	0.16	0.16	5.85E-04	0.06	159.14	1.38E-02	4.05E-03	160.69
Loader	2270002060	150	diesel	215	12	59%	5	4,373	3.70E-03	0.05	0.02	4.29E-03	4.16E-03	1.79E-04	8.91E-04	65.98	2.92E-04	1.68E-03	66.48
Telehandler	2270003010	150	diesel	201	12	21%	15	5,442	0.05	0.29	0.15	0.03	0.03	2.50E-04	1.08E-02	82.11	2.55E-03	2.09E-03	82.79
Project Cleanup																			
Telehandler	2270003010	150	diesel	201	12	21%	10	3,628	0.03	0.20	0.10	0.02	0.02	1.67E-04	7.22E-03	54.74	1.70E-03	1.39E-03	55.19
Tracked Skidsteer	2270002072	150	diesel	216	12	21%	20	7,233	0.18	0.96	0.58	0.11	0.11	4.01E-04	0.04	109.12	9.46E-03	2.78E-03	110.19
Transportation Trucks - material/waste	-	-	diesel	401	-	-	9	1,497	1.90E-03	0.04	0.02	7.44E-04	6.85E-04	5.65E-05	-	16.85	2.08E-04	1.94E-05	16.86
Daily Construction Traffic																			
Full size pickups, FedEx, UPS, and other delivery trucks, etc. daily	-	-	diesel	405	-	-	825	49,991	0.24	1.52	1.65	0.06	0.05	1.90E-03	-	562.62	0.04	2.87E-03	564.56
Buggies	-	-	gasoline	406	-	-	352	11,561	0.11	0.06	1.62	2.79E-03	2.47E-03	8.64E-04	-	130.11	9.33E-03	2.00E-03	130.94
Busses	-	-	diesel	403	-	-	66	6,175	8.76E-03	0.12	0.08	2.85E-03	2.62E-03	2.33E-04	-	69.50	1.54E-03	2.39E-04	69.61
							Total	**324,457**	**1.92**	**13.23**	**8.75**	**1.05**	**1.01**	**1.43E-02**	**0.36**	**4,547.13**	**0.15**	**0.10**	**4,579.36**

Notes:

1. Equipment assumptions based on information provided by the project.
2. Calculations assume equipment is used 5 days/wk - i.e 21 days/month.
3. Calculations conservatively assume that onroad vehicles travel approximately 50 miles per day, since emission factors from the MOVES2014 model for onroad vehicles are based on miles traveled.
4. Calculations conservatively assume workers average daily round trip commute is approximately 40 miles per day, since emission factors from the MOVES2014 model for onroad vehicles are based on miles traveled.
5. Nonroad emission factors for criteria pollutants and GHG were estimated using EPA's MOVES2014b emission model for an assumed construction year of 2024.
6. Nonroad emission factors for HAPs were estimated using ERG, "Documentation for Aircraft, Commercial Marine Vessel, Locomotive, and Other Nonroad Components of the National Emissions Inventory," Volume I - Methodology, October
7. Onroad vehicle emission factors (lb/VMT) for VOC, NOx, CO, PM10, SO2, and CO2e, were estimated using the MOVES2014b emission model for an assumed construction year of 2024.
8. Onroad vehicle emission factors for HAP were not provided with the default MOVES input files for Benton County, but are presumed to be de minimis.

Horse Heaven Wind Farm - Construction Emissions
Phase 2a Battery (150 MW)

								Fuel Use	Emissions										
Construction Equipment	**Source Category**	**HP per unit**	**Fuel Type**	**Emiss. Factor ID**	**hrs per day**	**Load Factor**	**Total Equip. Months**	**gal**	**VOC tons**	**NO_X tons**	**CO tons**	**PM_{10} tons**	**$PM_{2.5}$ tons**	**SO_2 tons**	**HAP Tons**	**CO_2 tons**	**CH_4 tons**	**N_2O tons**	**CO_2e tons**
Site Prep & Road Const																			
Bulldozer	2270002069	200	diesel	207	12	59%	4	4,665	2.25E-03	0.03	8.73E-03	1.79E-03	1.74E-03	1.88E-04	5.43E-04	70.38	1.42E-04	1.79E-03	70.92
Excavator / Backhoe	2270002036	150	diesel	208	12	59%	4	3,499	1.36E-03	0.03	8.70E-03	1.89E-03	1.83E-03	1.40E-04	3.28E-04	52.78	1.10E-04	1.34E-03	53.19
Loader / Skid Steer loader	2270002072	150	diesel	216	12	21%	2	723	0.02	0.10	0.06	1.10E-02	1.07E-02	4.01E-05	4.40E-03	10.91	9.46E-04	2.78E-04	11.02
Motor grader	2270002048	100	diesel	210	12	59%	2	1,166	6.37E-04	1.12E-02	4.19E-03	9.88E-04	9.59E-04	4.73E-05	1.54E-04	17.59	5.27E-05	4.48E-04	17.73
Vibratory Roller	2270002015	75	diesel	214	12	59%	2	971	8.52E-04	0.03	8.55E-03	1.12E-03	1.09E-03	3.97E-05	2.05E-04	14.65	6.60E-05	3.73E-04	14.77
Dump / Belly Truck	-	-	diesel	402	-	-	4	702	1.34E-03	0.02	1.07E-02	6.02E-04	5.54E-04	2.66E-05	-	7.90	1.75E-04	1.74E-05	7.91
Water Truck	-	-	diesel	404	-	-	2	203	7.58E-04	4.30E-03	2.74E-03	8.77E-05	8.06E-05	7.66E-06	-	2.29	3.37E-04	1.35E-05	2.30
Fuel Truck	-	-	diesel	404	-	-	2	203	7.58E-04	4.30E-03	2.74E-03	8.77E-05	8.06E-05	7.66E-06	-	2.29	3.37E-04	1.35E-05	2.30
Foundation																			
Rough Terrain Cranes	2270002045	200	diesel	206	12	43%	2	1,682	1.52E-03	0.02	4.29E-03	8.45E-04	8.19E-04	6.91E-05	3.65E-04	25.37	1.05E-04	6.46E-04	25.56
Concrete Truck	2270002042	150	diesel	204	12	43%	8	5,034	0.06	0.71	0.18	0.04	0.04	2.79E-04	1.49E-02	75.94	3.33E-03	1.93E-03	76.60
Backhoe or Excavator	2270002036	150	diesel	208	12	59%	4	3,499	1.36E-03	0.03	8.70E-03	1.89E-03	1.83E-03	1.40E-04	3.28E-04	52.78	1.10E-04	1.34E-03	53.19
Forklifts	2270003020	75	diesel	209	12	59%	4	1,943	3.97E-04	0.04	3.01E-03	5.41E-04	5.25E-04	7.73E-05	9.59E-05	29.31	2.91E-05	7.46E-04	29.53
Skid Steer loader	2270002072	150	diesel	216	12	21%	2	723	0.02	0.10	0.06	1.10E-02	1.07E-02	4.01E-05	4.40E-03	10.91	9.46E-04	2.78E-04	11.02
Dump Truck	-	-	diesel	402	-	-	4	702	1.34E-03	0.02	1.07E-02	6.02E-04	5.54E-04	2.66E-05	-	7.90	1.75E-04	1.74E-05	7.91
Transportation Trucks - materials	-	-	diesel	401	-	-	4	665	8.45E-04	0.02	9.26E-03	3.31E-04	3.04E-04	2.51E-05	-	7.49	9.24E-05	8.63E-06	7.49
Water Truck	-	-	diesel	404	-	-	2	203	7.58E-04	4.30E-03	2.74E-03	8.77E-05	8.06E-05	7.66E-06	-	2.29	3.37E-04	1.35E-05	2.30
Fuel Truck	-	-	diesel	404	-	-	2	203	7.58E-04	4.30E-03	2.74E-03	8.77E-05	8.06E-05	7.66E-06	-	2.29	3.37E-04	1.35E-05	2.30
Electrical																			
Boom Truck	2270003010	150	diesel	201	12	21%	2	726	6.00E-03	0.04	0.02	4.07E-03	3.95E-03	3.34E-05	1.44E-03	10.95	3.40E-04	2.79E-04	11.04
Fork Truck for Spool Offload	2270003020	75	diesel	209	12	59%	2	971	1.98E-04	0.02	1.50E-03	2.70E-04	2.62E-04	3.86E-05	4.79E-05	14.66	1.45E-05	3.73E-04	14.77
Man Lift Bucket	2270003010	150	diesel	201	12	21%	2	726	6.00E-03	0.04	0.02	4.07E-03	3.95E-03	3.34E-05	1.44E-03	10.95	3.40E-04	2.79E-04	11.04
Trencher	2270002030	200	diesel	219	12	59%	2	2,332	4.07E-03	0.05	0.02	3.03E-03	2.94E-03	9.89E-05	9.81E-04	35.18	2.73E-04	8.96E-04	35.45
Excavators / Backhoes	2270002036	150	diesel	208	12	59%	2	1,749	6.79E-04	1.45E-02	4.35E-03	9.44E-04	9.16E-04	7.02E-05	1.64E-04	26.39	5.52E-05	6.72E-04	26.59
Transportation Trucks - materials	-	-	diesel	401	-	-	4	665	8.45E-04	0.02	9.26E-03	3.31E-04	3.04E-04	2.51E-05	-	7.49	9.24E-05	8.63E-06	7.49
Project Cleanup																			
Front end loader	2270002060	150	diesel	215	12	59%	1	875	7.39E-04	9.78E-03	3.89E-03	8.58E-04	8.33E-04	3.58E-05	1.78E-04	13.20	5.85E-05	3.36E-04	13.30
Motor grader	2270002048	100	diesel	210	12	59%	1	583	3.19E-04	5.58E-03	2.09E-03	4.94E-04	4.79E-04	2.36E-05	7.70E-05	8.80	2.64E-05	2.24E-04	8.86
Dump Truck	-	-	diesel	402	-	-	1	175	3.34E-04	6.09E-03	2.67E-03	1.50E-04	1.38E-04	6.66E-06	-	1.97	4.37E-05	4.35E-06	1.98
Transportation Trucks - material/waste	-	-	diesel	401	-	-	1	166	2.11E-04	4.72E-03	2.32E-03	8.27E-05	7.61E-05	6.27E-06	-	1.87	2.31E-05	2.16E-06	1.87
Daily Construction Traffic																			
Full size pickups, FedEx, UPS, and other delivery trucks, etc. daily	-	-	diesel	405	-	-	400	24,238	0.12	0.74	0.80	0.03	0.02	9.23E-04	-	272.79	0.02	1.39E-03	273.73
							Total	**59,993**	**0.25**	**2.12**	**1.27**	**0.11**	**0.11**	**2.47E-03**	**0.03**	**797.29**	**0.03**	**1.37E-02**	**802.14**

Notes:
1. Equipment assumptions based on information provided by the project.
2. Calculations assume equipment is used 5 days/wk - i.e., 21 days/month.
3. Calculations conservatively assume that onroad vehicles travel approximately 50 miles per day, since emission factors from the MOVES2014 model for onroad vehicles are based on miles traveled.
4. Calculations conservatively assume workers average daily round trip commute is approximately 40 miles per day, since emission factors from the MOVES2014 model for onroad vehicles are based on miles traveled.
5. Nonroad emission factors for criteria pollutants and GHG were estimated using EPA's MOVES2014b emission model for an assumed construction year of 2024.
6. Nonroad emission factors for HAPs were estimated using ERG, "Documentation for Aircraft, Commercial Marine Vessel, Locomotive, and Other Nonroad Components of the National Emissions Inventory," Volume I - Methodology, October 7, 2
7. Onroad vehicle emission factors (lb/VMT) for VOC, NOx, CO, PM10, SO2, and CO2e, were estimated using the MOVES2014b emission model for an assumed construction year of 2024.
8. Onroad vehicle emission factors for HAP were not provided with the default MOVES input files for Benton County, but are presumed to be de minimis.

Horse Heaven Wind Farm - Construction Emissions
Phase 2b Wind (500 MW)

								Fuel Use	Emissions										
Construction Equipment	**Source Category**	**HP per unit**	**Fuel Type**	**Emiss. Factor ID**	**hrs per day**	**Load Factor**	**Total Equip. Months**	**gal**	**VOC tons**	**NO_X tons**	**CO tons**	**PM_{10} tons**	**$PM_{2.5}$ tons**	**SO_2 tons**	**HAP Tons**	**CO_2 tons**	**CH_4 tons**	**N_2O tons**	**CO_2e tons**
Site Prep & Road Const																			
Bulldozer	2270002069	200	diesel	207	12	59%	32	37,320	0.02	0.22	0.07	1.43E-02	1.39E-02	1.50E-03	4.34E-03	563.02	1.13E-03	1.43E-02	567.33
Excavator / Backhoe	2270002036	150	diesel	208	12	59%	32	27,991	1.09E-02	0.23	0.07	0.02	1.47E-02	1.12E-03	2.62E-03	422.28	8.82E-04	1.08E-02	425.50
Loader / Skid Steer loader	2270002072	150	diesel	216	12	21%	32	11,573	0.29	1.53	0.94	0.18	0.17	6.42E-04	0.07	174.59	0.02	4.45E-03	176.30
Motor grader	2270002048	100	diesel	210	12	59%	32	18,660	1.02E-02	0.18	0.07	0.02	0.02	7.57E-04	2.46E-03	281.51	8.44E-04	7.17E-03	283.67
Vibratory Roller	2270002015	75	diesel	214	12	59%	24	11,655	1.02E-02	0.33	0.10	1.34E-02	1.30E-02	4.77E-04	2.47E-03	175.84	7.92E-04	4.48E-03	177.19
Dump / Belly Truck	-	-	diesel	402	-	-	96	16,839	0.03	0.59	0.26	1.44E-02	1.33E-02	6.39E-04	-	189.51	4.20E-03	4.17E-04	189.74
Water Truck	-	-	diesel	404	-	-	64	6,497	0.02	0.14	0.09	2.81E-03	2.58E-03	2.45E-04	-	73.12	1.08E-02	4.31E-04	73.52
Fuel Truck	-	-	diesel	404	-	-	16	1,624	6.06E-03	0.03	0.02	7.01E-04	6.45E-04	6.12E-05	-	18.28	2.70E-03	1.08E-04	18.38
Foundation																			
Rough Terrain Cranes	2270002045	200	diesel	206	12	43%	18	15,134	1.37E-02	0.16	0.04	7.60E-03	7.37E-03	6.22E-04	3.29E-03	228.31	9.41E-04	5.81E-03	230.07
Concrete pump truck	2270002042	200	diesel	205	12	43%	12	10,070	0.11	1.33	0.33	0.06	0.06	5.59E-04	0.03	151.92	5.67E-03	3.87E-03	153.22
Concrete Truck	2270002042	150	diesel	204	12	43%	96	60,404	0.74	8.53	2.20	0.45	0.44	3.35E-03	0.18	911.27	0.04	0.02	919.19
Backhoe or Excavator	2270002036	150	diesel	208	12	59%	24	20,993	8.15E-03	0.17	0.05	1.13E-02	1.10E-02	8.43E-04	1.97E-03	316.71	6.62E-04	8.07E-03	319.13
Forklifts	2270003020	75	diesel	209	12	59%	18	8,743	1.78E-03	0.19	1.35E-02	2.43E-03	2.36E-03	3.48E-04	4.31E-04	131.90	1.31E-04	3.36E-03	132.90
Skid Steer loader	2270002072	150	diesel	216	12	21%	12	4,340	0.11	0.57	0.35	0.07	0.06	2.41E-04	0.03	65.47	5.68E-03	1.67E-03	66.11
Dump Truck	-	-	diesel	402	-	-	36	6,315	1.20E-02	0.22	0.10	5.42E-03	4.98E-03	2.40E-04	-	71.07	1.57E-03	1.56E-04	71.15
Transportation Trucks - materials	-	-	diesel	401	-	-	36	5,989	7.60E-03	0.17	0.08	2.98E-03	2.74E-03	2.26E-04	-	67.40	8.32E-04	7.77E-05	67.45
Water Truck	-	-	diesel	404	-	-	24	2,436	9.09E-03	0.05	0.03	1.05E-03	9.68E-04	9.19E-05	-	27.42	4.05E-03	1.62E-04	27.57
Fuel Truck	-	-	diesel	404	-	-	12	1,218	4.55E-03	0.03	0.02	5.26E-04	4.84E-04	4.59E-05	-	13.71	2.02E-03	8.08E-05	13.79
Electrical																			
Boom Truck	2270003010	150	diesel	201	12	21%	16	5,805	0.05	0.31	0.16	0.03	0.03	2.67E-04	1.16E-02	87.58	2.72E-03	2.23E-03	88.31
Fork Truck for Spool Offload	2270003020	75	diesel	209	12	59%	16	7,771	1.59E-03	0.17	1.20E-02	2.16E-03	2.10E-03	3.09E-04	3.83E-04	117.24	1.16E-04	2.99E-03	118.13
Man Lift Bucket	2270003010	150	diesel	201	12	21%	16	5,805	0.05	0.31	0.16	0.03	0.03	2.67E-04	1.16E-02	87.58	2.72E-03	2.23E-03	88.31
Trencher	2270002030	200	diesel	219	12	59%	16	18,656	0.03	0.38	0.12	0.02	0.02	7.91E-04	7.84E-03	281.45	2.19E-03	7.17E-03	283.64
Excavators / Backhoes	2270002036	150	diesel	208	12	59%	16	13,995	5.43E-03	0.12	0.03	7.55E-03	7.33E-03	5.62E-04	1.31E-03	211.14	4.41E-04	5.38E-03	212.75
Winch Truck	2270002051	250	diesel	211	12	59%	24	34,989	1.00E-02	0.12	0.02	4.67E-03	4.53E-03	1.39E-03	2.41E-03	527.85	4.22E-04	1.34E-02	531.87
Transportation Trucks - materials	-	-	diesel	401	-	-	64	10,647	1.35E-02	0.30	0.15	5.29E-03	4.87E-03	4.02E-04	-	119.83	1.48E-03	1.38E-04	119.91
Substation																			
Backhoe or Excavator	2270002036	150	diesel	208	12	59%	20	17,494	6.79E-03	0.14	0.04	9.44E-03	9.16E-03	7.02E-04	1.64E-03	263.92	5.52E-04	6.72E-03	265.94
Bulldozer	2270002069	200	diesel	207	12	59%	20	23,325	1.13E-02	0.13	0.04	8.96E-03	8.69E-03	9.40E-04	2.71E-03	351.89	7.09E-04	8.96E-03	354.58
Concrete Trucks	2270002042	150	diesel	204	12	43%	40	25,168	0.31	3.56	0.92	0.19	0.18	1.40E-03	0.07	379.70	0.02	9.67E-03	382.99
Drill Rig	2270002033	100	diesel	203	12	43%	20	8,390	0.10	1.14	0.29	0.07	0.06	4.63E-04	0.02	126.58	5.67E-03	3.22E-03	127.68
Man Lift Bucket	2270003010	150	diesel	201	12	21%	20	7,256	0.06	0.39	0.20	0.04	0.04	3.34E-04	1.44E-02	109.47	3.40E-03	2.79E-03	110.39
Trencher	2270002030	200	diesel	219	12	59%	20	23,320	0.04	0.48	0.15	0.03	0.03	9.89E-04	9.81E-03	351.81	2.73E-03	8.96E-03	354.55
Winch Truck	2270002051	250	diesel	211	12	59%	10	14,579	4.18E-03	0.05	9.67E-03	1.95E-03	1.89E-03	5.80E-04	1.01E-03	219.94	1.76E-04	5.60E-03	221.61
Cranes	2270002045	200	diesel	206	12	43%	20	16,815	0.02	0.18	0.04	8.45E-03	8.19E-03	6.91E-04	3.65E-03	253.68	1.05E-03	6.46E-03	255.63
Forklifts	2270003020	75	diesel	209	12	59%	20	9,714	1.98E-03	0.21	0.02	2.70E-03	2.62E-03	3.86E-04	4.79E-04	146.55	1.45E-04	3.73E-03	147.67
Skid Steer Loaders	2270002072	150	diesel	216	12	21%	10	3,617	0.09	0.48	0.29	0.06	0.05	2.01E-04	0.02	54.56	4.73E-03	1.39E-03	55.09
Dump Truck (Side or belly dump)	-	-	diesel	402	-	-	40	7,016	1.34E-02	0.24	0.11	6.02E-03	5.54E-03	2.66E-04	-	78.96	1.75E-03	1.74E-04	79.06
Wind Turbine Assembly & Erection																			
Man Lift Bucket	2270003010	150	diesel	201	12	21%	56	20,318	0.17	1.10	0.57	0.11	0.11	9.34E-04	0.04	306.53	9.53E-03	7.81E-03	309.09
Forklift	2270003020	75	diesel	209	12	59%	28	13,600	2.78E-03	0.30	0.02	3.79E-03	3.67E-03	5.41E-04	6.71E-04	205.17	2.04E-04	5.22E-03	206.73
Rough Terrain Cranes	2270002045	200	diesel	206	12	43%	70	58,853	0.05	0.64	0.15	0.03	0.03	2.42E-03	1.28E-02	887.87	3.66E-03	0.02	894.70
Track mounted cranes	2270002045	200	diesel	206	12	43%	18	15,134	1.37E-02	0.16	0.04	7.60E-03	7.37E-03	6.22E-04	3.29E-03	228.31	9.41E-04	5.81E-03	230.07
Transportation Trucks - materials &	-	-	diesel	401	-	-	336	55,898	7.10E-02	1.59	0.78	0.03	0.03	2.11E-03	-	629.10	7.76E-03	7.25E-04	629.51
Transmission Line																			
Cranes	2270002045	200	diesel	206	8	43%	8	4,484	4.05E-03	0.05	1.14E-02	2.25E-03	2.18E-03	1.84E-04	9.74E-04	67.65	2.79E-04	1.72E-03	68.17
Bucket Trucks	2270003010	150	diesel	201	8	21%	20	4,838	0.04	0.26	0.14	0.03	0.03	2.22E-04	9.63E-03	72.98	2.27E-03	1.86E-03	73.59
Wire Pullers	2270002081	100	diesel	213	6	59%	6	1,749	3.26E-03	0.04	1.35E-02	2.86E-03	2.78E-03	7.38E-05	7.86E-04	26.38	2.38E-04	6.72E-04	26.59
Wire Tensioners	2270002081	100	diesel	213	6	59%	6	1,749	3.26E-03	0.04	1.35E-02	2.86E-03	2.78E-03	7.38E-05	7.86E-04	26.38	2.38E-04	6.72E-04	26.59
Excavators or Backhoes	2270002036	150	diesel	208	4	59%	18	5,248	2.04E-03	0.04	1.31E-02	2.83E-03	2.75E-03	2.11E-04	4.92E-04	79.18	1.65E-04	2.02E-03	79.78
Forklifts	2270003020	75	diesel	209	4	59%	12	1,943	3.97E-04	0.04	3.01E-03	5.41E-04	5.25E-04	7.73E-05	9.59E-05	29.31	2.91E-05	7.46E-04	29.53
Truck / track diggers	2270002036	150	diesel	208	6	59%	4	1,749	6.79E-04	1.45E-02	4.35E-03	9.44E-04	9.16E-04	7.02E-05	1.64E-04	26.39	5.52E-05	6.72E-04	26.59
Dozers	2270002069	200	diesel	207	4	59%	5	1,944	9.39E-04	1.12E-02	3.64E-03	7.47E-04	7.24E-04	7.83E-05	2.26E-04	29.32	5.91E-05	7.47E-04	29.55
UTVs	2270001060	75	diesel	217	2	21%	6	201	2.68E-03	0.02	1.32E-02	1.79E-03	1.74E-03	9.71E-06	6.44E-04	3.04	1.07E-04	7.73E-05	3.06
Tractor	2270002066	150	diesel	218	6	21%	4	725	1.13E-02	0.06	0.04	7.33E-03	7.11E-03	3.68E-05	2.72E-03	10.93	7.19E-04	2.78E-04	11.03
Skid Steer Loaders	2270002072	150	diesel	216	6	21%	12	2,170	0.05	0.29	0.18	0.03	0.03	1.20E-04	1.32E-02	32.74	2.84E-03	8.34E-04	33.06
Underground boring equipment	2270002033	100	diesel	203	8	43%	12	3,356	0.04	0.45	0.12	0.03	0.03	1.85E-04	9.55E-03	50.63	2.27E-03	1.29E-03	51.07
Tractor Trailers	-	-	diesel	401	-	-	6	998	1.27E-03	0.03	1.39E-02	4.96E-04	4.56E-04	3.76E-05	-	11.23	1.39E-04	1.30E-05	11.24
Fuel Trucks / Trailers	-	-	diesel	404	-	-	6	609	2.27E-03	1.29E-02	8.23E-03	2.63E-04	2.42E-04	2.30E-05	-	6.86	1.01E-03	4.04E-05	6.89
O&M Building																			
Excavators or Backhoes	2270002036	150	diesel	208	10	59%	12	8,747	3.39E-03	0.07	0.02	4.72E-03	4.58E-03	3.51E-04	8.20E-04	131.96	2.76E-04	3.36E-03	132.97
Forklifts	2270003020	75	diesel	209	10	59%	8	3,238	6.61E-04	0.07	5.01E-03	9.01E-04	8.74E-04	1.29E-04	1.60E-04	48.85	4.85E-05	1.24E-03	49.22
Skid Steer Loaders	2270002072	150	diesel	216	10	21%	16	4,822	0.12	0.64	0.39	0.07	0.07	2.67E-04	0.03	72.75	6.31E-03	1.85E-03	73.46
Air compressor	2270006015	50	diesel	202	10	43%	4	779	2.14E-03	0.06	1.04E-02	1.32E-03	1.28E-03	3.34E-05	5.14E-04	11.75	2.47E-04	2.99E-04	11.84
Project Cleanup																			
Front end loader	2270002060	150	diesel	215	12	59%	10	8,746	7.39E-03	0.10	0.04	8.58E-03	8.33E-03	3.58E-04	1.78E-03	131.95	5.85E-04	3.36E-03	132.97
Motor grader	2270002048	100	diesel	210	12	59%	10	5,831	3.19E-03	0.06	0.02	4.94E-03	4.79E-03	2.36E-04	7.70E-04	87.97	2.64E-04	2.24E-03	88.65
Dump Truck	-	-	diesel	402	-	-	10	1,754	3.34E-03	0.06	0.03	1.50E-03	1.38E-03	6.66E-05	-	19.74	4.37E-04	4.35E-05	19.76
Transportation Trucks - material/waste	-	-	diesel	401	-	-	15	2,495	3.17E-03	0.07	0.03	1.24E-03	1.14E-03	9.41E-05	-	28.08	3.47E-04	3.24E-05	28.10
Daily Construction Traffic																			
Full size pickups, FedEx, UPS, and other delivery trucks, etc. daily	-	-	diesel	405	-	-	2,100	127,250	0.61	3.87	4.19	0.14	0.13	4.84E-03	-	1432.12	0.11	7.32E-03	1437.07
Worker Commute																			
Light Commercial Truck	-	-	diesel	405	-	-	1,626	98,528	0.47	2.99	3.25	0.11	0.10	3.75E-03	-	1108.87	0.09	5.66E-03	1112.71
Passenger Car	-	-	gasoline	406	-	-	1,084	35,602	0.33	0.19	4.98	8.60E-03	7.61E-03	2.66E-03	-	400.68	0.03	6.17E-03	403.24
							Total	**1,015,521**	**4.27**	**36.73**	**22.69**	**2.04**	**1.96**	**0.04**	**0.64**	**13,857.79**	**0.41**	**0.27**	**13,947.13**

Notes:

1. Equipment assumptions based on information provided by the project.
2. Calculations assume equipment is used 5 days/wk - i.e 21 days/month.
3. Calculations conservatively assume that onroad vehicles travel approximately 50 miles per day, since emission factors from the MOVES2014 model for onroad vehicles are based on miles traveled.
4. Calculations conservatively assume workers average daily round trip commute is approximately 40 miles per day, since emission factors from the MOVES2014 model for onroad vehicles are based on miles traveled.
5. Nonroad emission factors for criteria pollutants and GHG were estimated using EPA's MOVES2014b emission model for an assumed construction year of 2024.
6. Nonroad emission factors for HAPs were estimated using ERG, "Documentation for Aircraft, Commercial Marine Vessel, Locomotive, and Other Nonroad Components of the National Emissions Inventory," Volume I - Methodology, October 7, 2003.
7. Onroad vehicle emission factors (lb/VMT) for VOC, NOx, CO, PM10, SO2, and CO2e, were estimated using the MOVES2014b emission model for an assumed construction year of 2024.
8. Onroad vehicle emission factors for HAP were not provided with the default MOVES input files for Benton County, but are presumed to be de minimis.

Horse Heaven Wind Farm - Construction Emissions
Operations and Maintenance

								Fuel Use	Emissions										
Construction Equipment	Source Category	HP per unit	Fuel Type	Emiss. Factor ID	hrs per day	Load Factor	Total Equip. Months	gal	VOC tons	NO_X tons	CO tons	PM_{10} tons	$PM_{2.5}$ tons	SO_2 tons	HAP Tons	CO_2 tons	CH_4 tons	N_2O tons	CO_2e tons
Solar Panel Cleaning																			
Water Truck	-	-	diesel	404	-	-	24	2,436	9.09E-03	0.05	0.03	1.05E-03	9.68E-04	9.19E-05	-	27.42	4.05E-03	1.62E-04	27.57
Worker Commute																			
Light Commercial Truck	-	-	diesel	405	-	-	115	6,968	0.03	0.21	0.23	7.76E-03	7.14E-03	2.65E-04	-	78.43	6.07E-03	4.01E-04	78.70
Passenger Car	-	-	gasoline	406	-	-	77	2,529	0.02	0.01	0.35	6.11E-04	5.40E-04	1.89E-04	-	28.46	2.04E-03	4.38E-04	28.64
							Total	**11,934**	**0.07**	**0.28**	**0.62**	**9.43E-03**	**8.65E-03**	**5.46E-04**	**0.00**	**134.31**	**1.22E-02**	**1.00E-03**	**134.91**

Notes:

1. Equipment assumptions based on information provided by the project.
2. Calculations assume equipment is used 5 days/wk - i.e., 21 days/month.
3. Calculations conservatively assume that onroad vehicles travel approximately 50 miles per day, since emission factors from the MOVES2014 model for onroad vehicles are based on miles traveled.
4. Calculations conservatively assume workers average daily round trip commute is approximately 40 miles per day, since emission factors from the MOVES2014 model for onroad vehicles are based on miles traveled.
5. Nonroad emission factors for criteria pollutants and GHG were estimated using EPA's MOVES2014b emission model for an assumed construction year of 2024.
6. Nonroad emission factors for HAPs were estimated using ERG, "Documentation for Aircraft, Commercial Marine Vessel, Locomotive, and Other Nonroad Components of the National Emissions Inventory," Volume I - Methodology, October 7, 2
7. Onroad vehicle emission factors (lb/VMT) for VOC, NOx, CO, PM10, SO2, and CO2e, were estimated using the MOVES2014b emission model for an assumed construction year of 2024.
8. Onroad vehicle emission factors for HAP were not provided with the default MOVES input files for Benton County, but are presumed to be de minimis.

Horse Heaven Wind Farm
Emission Factors

2023 Factors for Land-based Nonroad Engines and Other Equipment (Benton County, WA)

				NONROAD Emission Factors (g/hp-hr) /a								Climate Leaders (g/kWh) /b		NONROAD
	NONROAD Source Category			Exhaust+ Crankcase	Exhaust	Exhaust	Exhaust	Exhaust	Exhaust	Exhaust	Exhaust	Exhaust	Fuel Consumption	Default
	SCC	Description	Engine Size (hp)	VOC	NO_x	CO	PM_{10}	$PM_{2.5}$	SO_2	CO_2	CH_4	N_2O	gal/kWh /c	Load Factor
101	2270003010	Aerial Lifts	100 < hp <= 175	0.376424	2.443597	1.276235	0.254440	0.246807	0.001927	625.5	0.020662	0.016	0.061	21%
102	2270006015	Air Compressors	50 < hp <= 75	0.119871	2.895070	0.596171	0.078496	0.076141	0.001705	590.0	0.013032	0.015	0.058	43%
103	2270002033	Bore/Drill Rigs	100 < hp <= 175	0.427554	4.897321	1.265764	0.283498	0.274993	0.001948	529.8	0.023823	0.013	0.052	43%
104	2270002042	Cement & Mortar Mixers	100 < hp <= 175	0.436188	5.030485	1.299992	0.266438	0.258445	0.001948	529.8	0.022694	0.013	0.052	43%
105	2270002042	Cement & Mortar Mixers	175 < hp <= 300	0.385082	4.731720	1.157440	0.216126	0.209642	0.001949	529.9	0.019336	0.013	0.052	43%
106	2270002045	Cranes	175 < hp <= 300	0.041190	0.501905	0.115081	0.022971	0.022281	0.001463	530.9	0.002864	0.014	0.052	43%
107	2270002069	Crawler Tractor/Dozers	175 < hp <= 300	0.021693	0.261679	0.093740	0.019313	0.018733	0.001446	536.8	0.001491	0.014	0.053	59%
108	2270002036	Excavators	100 < hp <= 175	0.017780	0.362621	0.116397	0.026855	0.026049	0.001439	536.8	0.001495	0.014	0.053	59%
109	2270003020	Forklifts	75 < hp <= 100	0.009126	0.877277	0.080988	0.014059	0.013638	0.001574	596.1	0.000691	0.015	0.058	59%
110	2270002048	Graders	100 < hp <= 175	0.027585	0.453197	0.184198	0.045672	0.044302	0.001464	536.8	0.002341	0.014	0.053	59%
111	2270002051	Off-highway Trucks	175 < hp <= 300	0.010901	0.128754	0.027887	0.005615	0.005447	0.001417	536.8	0.000494	0.014	0.053	59%
112	2270002081	Other Construction Equipment	50 < hp <= 75	0.139477	2.984215	0.921432	0.109816	0.106521	0.001689	595.8	0.012876	0.015	0.058	59%
113	2270002081	Other Construction Equipment	100 < hp <= 175	0.079433	0.920534	0.324906	0.069897	0.067800	0.001522	536.6	0.005693	0.014	0.053	59%
114	2270002015	Rollers	75 < hp <= 100	0.047096	1.233691	0.449010	0.057364	0.055643	0.001633	596.0	0.003470	0.015	0.058	59%
115	2270002060	Rubber Tire Loaders	100 < hp <= 175	0.039552	0.494267	0.194670	0.042373	0.041102	0.001470	536.7	0.003130	0.014	0.053	59%
116	2270002072	Skid Steer Loaders	100 < hp <= 175	1.058915	5.532446	3.396834	0.638169	0.619024	0.002293	623.5	0.052753	0.016	0.061	21%
117	2270001060	Specialty Vehicle Carts	50 < hp <= 75	0.669291	4.141205	3.279180	0.450044	0.436543	0.002247	694.1	0.025095	0.018	0.068	21%
118	2270002066	Tractors/Loaders/Backhoes	100 < hp <= 175	0.746563	4.152040	2.356593	0.476468	0.462175	0.002172	624.4	0.047102	0.016	0.061	21%
119	2270002030	Trenchers	175 < hp <= 300	0.074220	0.875665	0.280526	0.056045	0.054363	0.001530	536.6	0.004972	0.014	0.053	59%

/a Emission factors for the land-based nonroad engines were estimated using EPA's MOVES2014b emission model for an assumed construction year of 2023.

/b Emission factors for N_2O are based on Table B-8 of the EPA report, "Direct Emissions from Mobile Combustion Sources, U.S. EPA Center for Corporate Leadership – Greenhouse Gas Inventory Guidance," EPA430-K-16-004, January 2016. (0.26 g N2O/gal fuel)

/c Fuel consumption for each type of equipment was estimated based on CO2 emission factor (g/hp-hr) generated from the MOVES2014b model and the emission factor for the mass of CO2 generated per gallon of fuel (10.21 kg CO_2/gal fuel) as presented in Table A-1 of the EPA report, "Direct Emissions from Mobile Combustion Sources, U.S. EPA Center for Corporate Leadership – Greenhouse Gas Inventory Guidance," EPA430-K-16-004, January 2016.

Horse Heaven Wind Farm
Emission Factors

2024 Factors for Land-based Nonroad Engines and Other Equipment (Benton County, WA)

				NONROAD Emission Factors (g/hp-hr) /a								Climate Leaders (g/kWh) /b		NONROAD
	NONROAD Source Category			Exhaust+ Crankcase	Exhaust	Exhaust	Exhaust	Exhaust	Exhaust	Exhaust	Exhaust	Exhaust	Fuel Consumption	Default
	SCC	Description	Engine Size (hp)	VOC	NO_x	CO	PM_{10}	$PM_{2.5}$	SO_2	CO_2	CH_4	N_2O	gal/kWh /c	Load Factor
201	2270003010	Aerial Lifts	100 < hp <= 175	0.343116	2.244312	1.168366	0.232684	0.225704	0.001907	625.6	0.019457	0.016	0.061	21%
202	2270006015	Air Compressors	50 < hp <= 75	0.107269	2.833988	0.524802	0.066519	0.064523	0.001676	590.1	0.012384	0.015	0.058	43%
203	2270002033	Bore/Drill Rigs	100 < hp <= 175	0.415637	4.758356	1.220811	0.276390	0.268098	0.001938	529.9	0.023742	0.013	0.052	43%
204	2270002042	Cement & Mortar Mixers	100 < hp <= 175	0.431877	4.960604	1.278622	0.262782	0.254898	0.001948	529.8	0.023260	0.013	0.052	43%
205	2270002042	Cement & Mortar Mixers	175 < hp <= 300	0.380258	4.656690	1.136865	0.211408	0.205065	0.001949	530.0	0.019791	0.013	0.052	43%
206	2270002045	Cranes	175 < hp <= 300	0.031792	0.383332	0.089851	0.017676	0.017146	0.001446	531.0	0.002188	0.014	0.052	43%
207	2270002069	Crawler Tractor/Dozers	175 < hp <= 300	0.017180	0.205727	0.066568	0.013666	0.013256	0.001434	536.8	0.001081	0.014	0.053	59%
208	2270002036	Excavators	100 < hp <= 175	0.013805	0.294341	0.088521	0.019202	0.018626	0.001428	536.8	0.001122	0.014	0.053	59%
209	2270003020	Forklifts	75 < hp <= 100	0.008068	0.863434	0.061159	0.011000	0.010670	0.001571	596.1	0.000591	0.015	0.058	59%
210	2270002048	Graders	100 < hp <= 175	0.019442	0.340177	0.127815	0.030156	0.029251	0.001443	536.8	0.001608	0.014	0.053	59%
211	2270002051	Off-highway Trucks	175 < hp <= 300	0.010204	0.120191	0.023612	0.004752	0.004610	0.001415	536.8	0.000429	0.014	0.053	59%
212	2270002081	Other Construction Equipment	50 < hp <= 75	0.122516	2.900716	0.785789	0.091306	0.088567	0.001667	595.8	0.012211	0.015	0.058	59%
213	2270002081	Other Construction Equipment	100 < hp <= 175	0.066363	0.777606	0.274295	0.058201	0.056455	0.001502	536.6	0.004835	0.014	0.053	59%
214	2270002015	Rollers	75 < hp <= 100	0.034643	1.131882	0.347647	0.045550	0.044183	0.001616	596.1	0.002685	0.015	0.058	59%
215	2270002060	Rubber Tire Loaders	100 < hp <= 175	0.030069	0.397966	0.158162	0.034918	0.033870	0.001456	536.7	0.002379	0.014	0.053	59%
216	2270002072	Skid Steer Loaders	100 < hp <= 175	1.044565	5.461095	3.340533	0.631123	0.612190	0.002293	623.6	0.054061	0.016	0.061	21%
217	2270001060	Specialty Vehicle Carts	50 < hp <= 75	0.612170	3.999074	3.017768	0.410255	0.397947	0.002220	694.2	0.024358	0.018	0.068	21%
218	2270002066	Tractors/Loaders/Backhoes	100 < hp <= 175	0.645219	3.609054	2.049890	0.418799	0.406235	0.002105	624.7	0.041111	0.016	0.061	21%
219	2270002030	Trenchers	175 < hp <= 300	0.062155	0.730293	0.232913	0.046190	0.044804	0.001509	536.7	0.004169	0.014	0.053	59%

/a Emission factors for the land-based nonroad engines were estimated using EPA's MOVES2014b emission model for an assumed construction year of 2024.

/b Emission factors for N_2O are based on Table B-8 of the EPA report, "Direct Emissions from Mobile Combustion Sources, U.S. EPA Center for Corporate Leadership – Greenhouse Gas Inventory Guidance," EPA430-K-16-004, January 2016. (0.26 g N2O/gal fuel)

/c Fuel consumption for each type of equipment was estimated based on CO2 emission factor (g/hp-hr) generated from the MOVES2014b model and the emission factor for the mass of CO2 generated per gallon of fuel (10.21 kg CO_2/gal fuel) as presented in Table A-1 of the EPA report, "Direct Emissions from Mobile Combustion Sources, U.S. EPA Center for Corporate Leadership – Greenhouse Gas Inventory Guidance," EPA430-K-16-004, January 2016.

Horse Heaven Wind Farm
Emission Factors

2023 Factor for On-road Vehicles (Benton County, WA)

			MOVES2014b Emission factors in grams/VMT /a										
			VOC	NO_x	CO	PM_{10}	PM2.5	SO_2	CO_2	CH_4	N_2O	CO_2e	mi/gal
301	Diesel Combination Long-haul Truck		0.19708	4.36280	2.06888	0.08199	0.07543	0.00554	1653.0	0.02078	0.00187	1654.0	6.18
302	Diesel Refuse Truck		0.32863	5.72492	2.40662	0.15755	0.14494	0.00584	1729.2	0.03852	0.00376	1731.2	5.90
303	Diesel Single Unit Long-haul Truck		0.12184	1.62455	1.06090	0.03698	0.03402	0.00310	926.1	0.02096	0.00313	927.6	11.02
304	Diesel Single Unit Short-haul Truck		0.34450	1.98908	1.22486	0.04459	0.04102	0.00337	1005.3	0.14599	0.00583	1010.7	10.16
305	Diesel Light Commercial Truck		0.28924	1.80128	1.98747	0.06054	0.05570	0.00206	607.4	0.04553	0.00301	608.6	16.81
306	Gasoline Passenger Car		0.27542	0.17850	4.10694	0.00691	0.00611	0.00217	327.2	0.02458	0.00515	329.1	31.20

/a Emission factors (lb/VMT) for VOC, NOx, CO, PM10, SO2, and CO2e, were derived using the MOVES2014 model and inputs for calendar year 2023 using the default input files for calendar year 2023 from the State of Washington Department of Ecology.

2024 Factor for On-road Vehicles (Benton County, WA)

			MOVES2014b Emission factors in grams/VMT /a										
			VOC	NO_x	CO	PM_{10}	PM2.5	SO_2	CO_2	CH_4	N_2O	CO_2e	mi/gal
401	Diesel Combination Long-haul Truck		0.18245	4.08130	2.00034	0.07144	0.06572	0.00542	1617.7	0.01996	0.00187	1618.7	6.31
402	Diesel Refuse Truck		0.28885	5.26539	2.30820	0.13000	0.11960	0.00575	1705.6	0.03780	0.00376	1707.6	5.99
403	Diesel Single Unit Long-haul Truck		0.11464	1.55932	1.04570	0.03728	0.03430	0.00305	909.8	0.02010	0.00313	911.2	11.22
404	Diesel Single Unit Short-haul Truck		0.32730	1.85878	1.18535	0.03787	0.03484	0.00331	987.2	0.14565	0.00582	992.5	10.34
405	Diesel Light Commercial Truck		0.25216	1.59025	1.72447	0.05833	0.05367	0.00199	589.2	0.04557	0.00301	590.4	17.33
406	Gasoline Passenger Car		0.26095	0.14939	3.96998	0.00685	0.00606	0.00212	319.4	0.02291	0.00492	321.2	31.97

/a Emission factors (lb/VMT) for VOC, NOx, CO, PM10, SO2, and CO2e, were derived using the MOVES2014 model and inputs for calendar year 2024 using the default input files for calendar year 2024 from the State of Washington Department of Ecology.

Horse Heaven Wind Farm
MOVES Emission Factors

Benton County, WA												
Input Year	Fuel	Vehicle Type	Emission Factor grams/VMT									
			VOC	NOx	CO	PM10	PM2.5	SO2	CO2	CH4	N2O	CO2e
2023	Diesel	Combination Long-haul Truck	0.19708	4.36280	2.06888	0.08199	0.07543	0.00554	1653.0	0.02078	0.00187	1654.0
		Combination Short-haul Truck	0.20423	4.06897	1.91375	0.07046	0.06483	0.00552	1650.4	0.03287	0.00291	1652.1
		Single Unit Long-haul Truck	0.12184	1.62455	1.06090	0.03698	0.03402	0.00310	926.1	0.02096	0.00313	927.6
		Single Unit Short-haul Truck	0.34450	1.98908	1.22486	0.04459	0.04102	0.00337	1005.3	0.14599	0.00583	1010.7
		Refuse Truck	0.32863	5.72492	2.40662	0.15755	0.14494	0.00584	1729.2	0.03852	0.00376	1731.2
		Light Commercial Truck	0.28924	1.80128	1.98747	0.06054	0.05570	0.00206	607.4	0.04553	0.00301	608.6
		Passenger Car	0.19987	0.10901	4.07464	0.00257	0.00237	0.00114	340.9	0.00394	0.00068	341.2
	Gasoline	Combination Short-haul Truck	9.23402	7.44913	135.8309	0.07234	0.06400	0.01038	1563.0	0.33299	0.03792	1582.5
		Single Unit Long-haul Truck	0.76947	0.38745	7.97404	0.01577	0.01395	0.00674	1014.4	0.02776	0.00928	1017.8
		Single Unit Short-haul Truck	1.12743	0.66741	11.18899	0.03934	0.03480	0.00717	1079.0	0.06638	0.04681	1093.0
		Refuse Truck	3.28673	4.48433	39.12965	0.18280	0.16171	0.00784	1180.6	0.17743	0.07946	1208.7
		Light Commercial Truck	0.28364	0.31128	5.17191	0.01102	0.00975	0.00298	448.9	0.03101	0.00922	452.2
		Passenger Car	0.27542	0.17850	4.10694	0.00691	0.00611	0.00217	327.2	0.02458	0.00515	329.1

Note: Emission factors (lb/VMT) for VOC, NOx, CO, PM10, SO2, and CO2e, were derived using the MOVES2014 model and inputs for calendar year 2023 using the de input files for Benton County from the State of Washington Department of Ecology.

Benton County, WA												
Input Year	Fuel	Vehicle Type	Emission Factor grams/VMT									
			VOC	NOx	CO	PM10	PM2.5	SO2	CO2	CH4	N2O	CO2e
2024	Diesel	Combination Long-haul Truck	0.18245	4.08130	2.00034	0.07144	0.06572	0.00542	1617.7	0.01996	0.00187	1618.7
		Combination Short-haul Truck	0.19133	3.85586	1.85778	0.06245	0.05746	0.00541	1616.8	0.03167	0.00291	1618.4
		Single Unit Long-haul Truck	0.11464	1.55932	1.04570	0.03728	0.03430	0.00305	909.8	0.02010	0.00313	911.2
		Single Unit Short-haul Truck	0.32730	1.85878	1.18535	0.03787	0.03484	0.00331	987.2	0.14565	0.00582	992.5
		Refuse Truck	0.28885	5.26539	2.30820	0.13000	0.11960	0.00575	1705.6	0.03780	0.00376	1707.6
		Light Commercial Truck	0.25216	1.59025	1.72447	0.05833	0.05367	0.00199	589.2	0.04557	0.00301	590.4
		Passenger Car	0.19368	0.09464	3.90412	0.00255	0.00235	0.00110	329.4	0.00323	0.00068	329.6
	Gasoline	Combination Short-haul Truck	7.57169	6.25666	112.9196	0.06689	0.05917	0.01057	1590.7	0.28324	0.03486	1608.1
		Single Unit Long-haul Truck	0.70314	0.32138	7.51225	0.01459	0.01291	0.00669	1007.1	0.02535	0.00864	1010.3
		Single Unit Short-haul Truck	1.08079	0.60565	10.67867	0.03860	0.03415	0.00712	1071.7	0.06378	0.04355	1084.8
		Refuse Truck	3.54956	4.40078	38.29389	0.18183	0.16085	0.00789	1187.7	0.17365	0.07850	1215.3
		Light Commercial Truck	0.27141	0.27620	4.88040	0.01095	0.00968	0.00293	440.5	0.02907	0.00876	443.6
		Passenger Car	0.26095	0.14939	3.96998	0.00685	0.00606	0.00212	319.4	0.02291	0.00492	321.2

Note: Emission factors (lb/VMT) for VOC, NOx, CO, PM10, SO2, and CO2e, were derived using the MOVES2014 model and inputs for calendar year 2024 using the de input files for Benton County from the State of Washington Department of Ecology.

HORSE HEAVEN WIND FARM
EPA NEI HAP Emission Factors for Nonroad Diesels

HAP emission factors for nonroad diesels (below) were obtained from ERG, "Documentation for Aircraft, Commercial Marine Vessel, Locomotive, and Other Nonroad Components of the National Emissions Inventory," Volume I - Methodology, October 7, 2003 (available from http://www.epa.gov/ttn/chief/net/1999inventory.html#final3haps), Appendix D, Tables D-1 through D-3. This is the reference cited by EPA's National Inventory Model (NMIM), i.e., US EPA, "EPA's National Inventory Model (NMIM), A Consolidated Emissions Modeling System for MOBILE6 and NONROAD", EPA420-R-05-024, December 2005 (available from http://www.epa.gov/otaq/models/nmim/420r05024.pdf), pp. 19-21.

Pollutant	Fraction of	Emissions Factor %
1,3-butadiene	VOC - Exhaust	0.0018616
formaldehyde	VOC	0.11815
benzene	VOC	0.020344
acetaldehyde	VOC	0.05308
ethylbenzene	VOC - Exhaust	0.0031001
styrene	VOC - Exhaust	0.00059448
acrolein	VOC	0.00303
toluene	VOC	0.014967
hexane	VOC	0.0015913
propionaldehyde	VOC	0.011815
2,2,4-trimethylpentane	VOC	0.000719235
2,3,7,8-TCDD TEQ **	tons TEQ/gal	1.90705E-14
xylenes	VOC	0.010582
	Total HAP (ratioed to VOC)	**0.239834715**
PAH		
benz[a]anthracene	PM10	0.0000071
benzo[a]pyrene	PM10	0.00000035
benzo[b]fluoranthene	PM10	0.00000049
benzo[k]fluoranthene	PM10	0.00000035
chrysene	PM10	0.0000019
dibenzo[a,h]anthracene	PM10	2.9E-09
indeno[1,2,3-c,d]pyrene	PM10	0.000000079
acenaphthene	PM10	0.0001
acenaphthylene	PM10	0.000084
anthracene	PM10	0.00000043
benzo[g,h,i]perylene	PM10	0.00000019
fluoranthene	PM10	0.000017
fluorene	PM10	0.0001
naphthalene	PM10	0.00046
phenanthrene	PM10	0.00026
pyrene	PM10	0.0000029
	Total HAP (ratioed to PM10)	**0.001034792**
chromium	ug/bhp-hr	0.03
manganese	ug/bhp-hr	1.37
nickel	ug/bhp-hr	2.035
	Total HAP (Metals ug/bhp-hr)	**3.435**

** Note: the emission rate for 2,3,7,8-TCDD TEQ is significantly lower than any other HAP and therefore, was not factored into the total HAP emission factor.

This Page Intentionally Left Blank

EFSEC Supplementary Emission Calculations

This Page Intentionally Left Blank

Horse Heaven Wind Farm - Construction Emissions Emission Summary by Phase and Calendar Year

Emission Totals by Phase	**VOC tons**	**NO_X tons**	**CO tons**	**PM_{10} tons**	**$PM_{2.5}$ tons**	**SO_2 tons**	**HAP Tons**	**CO_2 tons**	**CH_4 tons**	**N_2O tons**	**CO_2e tons**
Phase 1 Wind	3.03	24.66	17.83	1.34	1.29	0.03	0.40	9,093.78	0.29	0.17	9,150.72
Phase 1 Solar	2.12	14.67	9.94	1.15	1.11	0.02	0.39	4,794.30	0.16	0.10	4,827.91
Phase 1 Battery	0.27	2.29	1.42	0.12	0.11	2.51E-03	0.03	806.49	0.03	1.37E-02	811.34
Phase 1 total	**5.43**	**41.63**	**29.19**	**2.61**	**2.51**	**0.05**	**0.82**	**14,694.57**	**0.48**	**0.28**	**14,789.97**
Phase 2a Wind	3.47	29.48	18.44	1.68	1.62	0.04	0.53	11,198.93	0.33	0.22	11,272.03
Phase 2a Solar	1.92	13.23	8.75	1.05	1.01	1.43E-02	0.36	4,547.13	0.15	0.10	4,579.36
Phase 2a Battery	0.25	2.12	1.27	0.11	0.11	2.47E-03	0.03	797.29	0.03	1.37E-02	802.14
Phase 2a total	**5.64**	**44.82**	**28.46**	**2.84**	**2.73**	**0.05**	**0.92**	**16,543.35**	**0.51**	**0.33**	**16,653.53**
Phase 2b Wind	4.27	36.73	22.69	2.04	1.96	0.04	0.64	13,857.79	0.41	0.27	13,947.13
Phase 2b total	**4.27**	**36.73**	**22.69**	**2.04**	**1.96**	**0.04**	**0.64**	**13,857.79**	**0.41**	**0.27**	**13,947.13**
O&M	0.07	0.28	0.62	9.43E-03	8.65E-03	5.46E-04	0	134.31	1.22E-02	1.00E-03	134.91
O&M total	**0.07**	**0.28**	**0.62**	**9.43E-03**	**8.65E-03**	**5.46E-04**	**0**	**134.31**	**1.22E-02**	**1.00E-03**	**134.91**

Emission Totals by Calendar Year	**VOC tons**	**NO_X tons**	**CO tons**	**PM_{10} tons**	**$PM_{2.5}$ tons**	**SO_2 tons**	**HAP Tons**	**CO_2 tons**	**CH_4 tons**	**N_2O tons**	**CO_2e tons**
2023 (Phase 1)	5.43	41.63	29.19	2.61	2.51	0.05	0.82	14,694.57	0.48	0.28	14,789.97
2024 (Maximum of Phase 2a or 2b)	5.64	44.82	28.46	2.84	2.73	0.05	0.92	16,543.35	0.51	0.33	16,653.53
2025 and onward (O&M)	0.07	0.28	0.62	9.43E-03	8.65E-03	5.46E-04	0	134.31	1.22E-02	1.00E-03	134.91

Project-Related Impacts									**# Construction Scheduled Days**			**Factor to multiply (frequency)**		
Project Component	**Units**	**Dimensions per Unit**	**Number of Units**	**Temporary Disturbance Acres[1/]**	**Units[2/]**	**Dimensions per Unit[3/]**	**Number of Units[4/]**	**Permanent Disturbance Acres**	**Phase 1**	**Phase 2a**	**Phase 2b**	**Phase 1**	**Phase 2a**	**Phase 2b**
Wind Turbine Generators	Acres per tower	4.51	244	1,070	Square feet per tower	5,278.0	244	30	198	199	199	0.54	0.55	0.55
Overhead Collector Lines[2/]	Feet of width per linear foot	35	1.8 (mi)	0.5	Square feet per structure	7.1	58	0.01	163	164	164	0.45	0.45	0.45
Underground Collector Lines[2/]	Feet of width per linear foot	30	285.4 (mi)	787	Square feet per structure	25.0	103	0.06	163	164	164	0.45	0.45	0.45
230-kV Transmission Lines	Feet of width per linear foot	100	19.4 (mi)	235	Square feet per structure	4.3	213	0.02	NA	NA	213	NA	NA	0.58
500-kV Transmission Lines	Feet of width per linear foot	200	0.5 (mi)	12	Square feet per structure	4.3	4	<0.01	NA	213	NA	NA	0.58	NA
Meteorological Towers	Acres	1.62	13	21	Square feet per tower	1,764	13	0.5	163	164	164	0.45	0.45	0.45
Meteorological Towers Roads	Feet of width per linear foot	50	2.8 (mi)	17	Feet of width per linear foot	16.0	2.8 (mi)	5	NA	NA	NA	NA	NA	NA
New Access Roads[4/]	Feet of width per linear foot	50	104.5	634	Feet of width per linear foot	16	104.5 (mi)	203	NA	NA	NA	NA	NA	NA
Road Modification (Turning Radius Widening)	Each	--	19	3	Acres	--	--	0	NA	NA	NA	NA	NA	NA
Crane Paths	Feet of width per linear foot	36	33.6 (mi)	147	Feet of width per linear foot	--	--	0	NA	NA	NA	NA	NA	NA
Substations[5/]	Acres	--	5	3	Acres	--	5	38	163	164	164	0.45	0.45	
Battery Storage Facilities	Acres	--	3	1	Acres	--	3	18	120	120	NA	0.33	0.33	NA
Laydown Yards	Acres	--	2	48	Acres	--	--	0	NA	NA	NA	NA	NA	NA
O&M Building	Acres	--	2	0.9	Acres	--	2	10	103	103	103	0.28	0.28	
Solar Array County Well	Acres	--	--	18	Acres	--	--	2,641[6/]	NA	304	NA	NA	0.83	NA
Solar Array Sellards	Acres	--	--	22	Acres	--	--	1,935[6/]	303	304	NA	0.83	0.83	NA
Solar Array East	Acres	--	--	37	Acres	--	--	1,994[6/]	303	NA	NA	0.83	NA	NA
Total Impacts[7/]:		Temporary		2,957	Permanent			6,869						Total

1/ Overlapping permanent disturbance area is subtracted from temporary impact corridors/areas (e.g., temporary impact area around a Turbine does not include the Turbine foundation and graveled area; those are shown only in the permanent impact column).
2/ The collector lines within the solar siting area are not included in this row. Collector lines associated with the Project's solar component are within the fenceline and included in the total permanent disturbance reported for the solar arrays. As the entire area is considered permanently disturbed, no temporary impact is estimated for collector lines within the solar siting area.
3/ See Table 2.3-3 for alternates under consideration for transmission lines. The longest potential transmission line alternative would be construction of the intertie between the alternate HH-West substation and the HH-East substation (19.4 miles). Table 2.3-3 describes other potential combinations of transmission line but none would have greater disturbance area than shown here.
4/ As for collector lines, disturbance from construction of new access roads associated with the Project's solar component is included in the total permanent disturbance reported for the solar siting area. As the entire area within the fenceline is considered permanently disturbed, no temporary impact is estimated for new access roads within the solar siting area.
5/ A total of five Project substation locations are under consideration but no more than four substations would be constructed (see Table 2.3-2). The disturbance area associated with all five locations is shown here as a conservative depiction of potential project impacts.
6/ Permanent Disturbance for Solar Arrays is shown here as disturbance of all areas inside the fence line. However, vegetation would remain within the majority of the solar array except for graveled interior access roads, inverter pad placement, and tracker system support posts,
7/ Totals were calculated using consolidated data, with areas of overlap eliminated. Therefore, totals are not a sum of the Project component rows.

Temporary			Permanent			Total Area (acres)			Total Area (acres) adjusted		
Phase 1	Phase 2a	Phase 2b	Phase 1	Phase 2a	Phase 2b	Phase 1	Phase 2a	Phase 2b	Phase 1	Phase 2a	Phase 2b
340	244	486	10	7	14	350	251	499	189.7	136.9	272.2
0.167	0.167	0.167	0.003	0.003	0.003	0	0	0	0.1	0.1	0.1
262.33	262.33	262.33	0.02	0.02	0.02	262	262	262	117.2	117.9	117.9
NA	NA	235	NA	NA	0.02	NA	NA	235	NA	NA	137.1
NA	12	NA	NA	0.01	NA	NA	12	NA	NA	7.0	NA
10.5	10.5	10.5	0.25	0.25	0.25	11	11	11	4.8	4.8	4.8
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
0.6	1.8	0.6	7.6	22.8	7.6	8	25	8	3.7	11.1	0.0
0.3333333	0.666666667	no battery storage facilities	6	12	no battery storage facilities	6	13	NA	2.1	4.2	NA
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
0.45	0.45	0.45	5	5	5	5	5	5	1.5	1.5	0.0
NA	18	NA	NA	NA	NA	NA	18	NA	NA	NA	NA
11	11	NA	NA	NA	NA	11	11	NA	9.1	NA	NA
37	NA	NA	NA	NA	NA	37	NA	NA	30.7	NA	NA
663	561	995	28	47	27	691	608	1021	359	283	532

Horse Heaven Wind Farm - Construction Emissions
Summary of Construction Schedule by Phase

Proposed Phase 1 Construction Schedule		
Task	**Start**	**Finish**
Road Construction	1/13/2023	5/3/2023
Wind Turbine Foundations	1/27/2023	4/26/2023
Wind Turbine Assembly	5/4/2023	8/21/2023
Wind Plant Commissioning	7/31/2023	10/30/2023
Solar Array Construction	1/1/2023	10/31/2023
Electrical System Installation	2/15/2023	9/1/2023
Battery Energy Storage System	5/4/2023	9/1/2023
Solar Plant Commissioning	9/1/2023	11/30/2023
Electrical System and Substation	2/15/2023	7/28/2023
O&M Building	3/17/2023	6/28/2023
Phase 1 Final Commercial Operation Date	**11/30/2023**	**-**
Proposed Phase 2a Construction Schedule		
Task	**Start**	**Finish**
Road Construction	1/13/2024	5/3/2024
Wind Turbine Foundations	1/27/2024	4/26/2024
Wind Turbine Assembly	5/4/2024	8/21/2024
Wind Plant Commissioning	7/31/2024	10/30/2024
Solar Array Construction	1/1/2024	10/31/2024
Electrical System Installation	2/15/2024	9/1/2024
Battery Energy Storage System	5/4/2024	9/1/2024
Solar Plant Commissioning	9/1/2024	11/30/2024
Electrical System and Substation	2/15/2024	7/28/2024
O&M Facilities	3/17/2024	6/28/2024
Transmission Line Construction	1/1/2024	8/1/2024
Phase 2a Final Commercial Operation Date	**11/30/2024**	**-**
Proposed Phase 2b Construction Schedule		
Task	**Start**	**Finish**
Road Construction	1/13/2024	5/3/2024
Wind Turbine Foundations	1/27/2024	4/26/2024
Electrical System and Substation	2/15/2024	7/28/2024
Wind Turbine Assembly	5/4/2024	8/21/2024
O&M Facilities	3/17/2024	6/28/2024
Transmission Line Construction	1/1/2024	8/1/2024
Plant Commissioning	7/31/2024	10/30/2024
Phase 2b Final Commercial Operation Date	**10/30/2024**	**-**

Adapted from Tables 2.15-2 through 2.15-4 of EFSEC ASC

Horse Heaven Wind Farm - Construction Emissions Phase 1 Wind (350 MW)

								Fuel Use	Emissions										
Construction Equipment	**Source Category**	**HP per unit**	**Fuel Type**	**Emiss. Factor ID**	**hrs per day**	**Load Factor**	**Total Equip. Months**	**gal**	**VOC tons**	**NO_X tons**	**CO tons**	**PM_{10} tons**	**$PM_{2.5}$ tons**	**SO_2 tons**	**HAP Tons**	**CO_2 tons**	**CH_4 tons**	**N_2O tons**	**CO_2e tons**
Site Prep & Road Const																			
Bulldozer	2270002069	200	diesel	107	12	59%	24	27,989	0.02	0.21	0.07	0.02	1.47E-02	1.14E-03	4.11E-03	422.26	1.17E-03	1.08E-02	425.49
Excavator / Backhoe	2270002036	150	diesel	108	12	59%	24	20,993	1.05E-02	0.21	0.07	0.02	0.02	8.49E-04	2.53E-03	316.70	8.82E-04	8.06E-03	319.13
Loader / Skid Steer loader	2270002072	150	diesel	116	12	21%	24	8,679	0.22	1.16	0.71	0.13	0.13	4.81E-04	0.05	130.94	1.11E-02	3.33E-03	132.21
Motor grader	2270002048	100	diesel	110	12	59%	24	13,994	1.09E-02	0.18	0.07	0.02	0.02	5.76E-04	2.62E-03	211.12	9.21E-04	5.38E-03	212.75
Vibratory Roller	2270002015	75	diesel	114	12	59%	18	8,741	1.04E-02	0.27	0.10	1.27E-02	1.23E-02	3.61E-04	2.51E-03	131.87	7.68E-04	3.36E-03	132.89
Dump / Belly Truck	-	-	diesel	302	-	-	72	12,804	0.03	0.48	0.20	1.31E-02	1.21E-02	4.87E-04	-	144.10	3.21E-03	3.13E-04	144.27
Water Truck	-	-	diesel	304	-	-	48	4,963	0.02	0.11	0.07	2.48E-03	2.28E-03	1.87E-04	-	55.85	8.11E-03	3.24E-04	56.15
Fuel Truck	-	-	diesel	304	-	-	12	1,241	4.78E-03	0.03	0.02	6.19E-04	5.70E-04	4.68E-05	-	13.96	2.03E-03	8.09E-05	14.04
Foundation																			
Rough Terrain Cranes	2270002045	200	diesel	106	12	43%	12	10,089	1.18E-02	0.14	0.03	6.58E-03	6.39E-03	4.19E-04	2.84E-03	152.20	8.21E-04	3.88E-03	153.37
Concrete pump truck	2270002042	200	diesel	105	12	43%	8	6,713	0.07	0.90	0.22	0.04	0.04	3.72E-04	0.02	101.28	3.70E-03	2.58E-03	102.14
Concrete Truck	2270002042	150	diesel	104	12	43%	64	40,268	0.50	5.77	1.49	0.31	0.30	2.23E-03	0.12	607.50	0.03	0.02	612.76
Backhoe or Excavator	2270002036	150	diesel	108	12	59%	16	13,995	6.99E-03	0.14	0.05	1.06E-02	1.02E-02	5.66E-04	1.69E-03	211.13	5.88E-04	5.38E-03	212.75
Forklifts	2270003020	75	diesel	109	12	59%	12	5,828	1.35E-03	0.13	1.19E-02	2.07E-03	2.01E-03	2.32E-04	3.25E-04	87.93	1.02E-04	2.24E-03	88.60
Skid Steer loader	2270002072	150	diesel	116	12	21%	8	2,893	0.07	0.39	0.24	0.04	0.04	1.60E-04	0.02	43.65	3.69E-03	1.11E-03	44.07
Dump Truck	-	-	diesel	302	-	-	24	4,268	9.13E-03	0.16	0.07	4.38E-03	4.03E-03	1.62E-04	-	48.03	1.07E-03	1.04E-04	48.09
Transportation Trucks - materials	-	-	diesel	301	-	-	24	4,080	5.47E-03	0.12	0.06	2.28E-03	2.10E-03	1.54E-04	-	45.92	5.77E-04	5.18E-05	45.95
Water Truck	-	-	diesel	304	-	-	12	1,241	4.78E-03	0.03	0.02	6.19E-04	5.70E-04	4.68E-05	-	13.96	2.03E-03	8.09E-05	14.04
Fuel Truck	-	-	diesel	304	-	-	8	827	3.19E-03	0.02	1.13E-02	4.13E-04	3.80E-04	3.12E-05	-	9.31	1.35E-03	5.39E-05	9.36
Electrical																			
Boom Truck	2270003010	150	diesel	101	12	21%	8	2,902	0.03	0.17	0.09	0.02	0.02	1.35E-04	6.34E-03	43.78	1.45E-03	1.11E-03	44.15
Fork Truck for Spool Offload	2270003020	75	diesel	109	12	59%	12	5,828	1.35E-03	0.13	1.19E-02	2.07E-03	2.01E-03	2.32E-04	3.25E-04	87.93	1.02E-04	2.24E-03	88.60
Man Lift Bucket	2270003010	150	diesel	101	12	21%	12	4,353	0.04	0.26	0.13	0.03	0.03	2.02E-04	9.51E-03	65.67	2.17E-03	1.67E-03	66.23
Trencher	2270002030	200	diesel	119	12	59%	12	13,991	0.03	0.34	0.11	0.02	0.02	6.02E-04	7.03E-03	211.07	1.96E-03	5.37E-03	212.72
Excavators / Backhoes	2270002036	150	diesel	108	12	59%	12	10,496	5.24E-03	0.11	0.03	7.92E-03	7.68E-03	4.24E-04	1.27E-03	158.35	4.41E-04	4.03E-03	159.56
Winch Truck	2270002051	250	diesel	111	12	59%	18	26,242	8.04E-03	0.09	0.02	4.14E-03	4.02E-03	1.05E-03	1.94E-03	395.89	3.64E-04	1.01E-02	398.90
Transportation Trucks - materials	-	-	diesel	301	-	-	32	5,440	7.30E-03	0.16	0.08	3.04E-03	2.79E-03	2.05E-04	-	61.22	7.70E-04	6.91E-05	61.26
Substation																			
Backhoe or Excavator	2270002036	150	diesel	108	12	59%	8	6,998	3.50E-03	0.07	0.02	5.28E-03	5.12E-03	2.83E-04	8.45E-04	105.57	2.94E-04	2.69E-03	106.38
Bulldozer	2270002069	200	diesel	107	12	59%	8	9,330	5.69E-03	0.07	0.02	5.06E-03	4.91E-03	3.79E-04	1.37E-03	140.75	3.91E-04	3.58E-03	141.83
Concrete Trucks	2270002042	150	diesel	104	12	43%	16	10,067	0.13	1.44	0.37	0.08	0.07	5.58E-04	0.03	151.87	6.51E-03	3.87E-03	153.19
Drill Rig	2270002033	100	diesel	103	12	43%	8	3,356	0.04	0.47	0.12	0.03	0.03	1.86E-04	9.83E-03	50.63	2.28E-03	1.29E-03	51.07
Man Lift Bucket	2270003010	150	diesel	101	12	21%	8	2,902	0.03	0.17	0.09	0.02	0.02	1.35E-04	6.34E-03	43.78	1.45E-03	1.11E-03	44.15
Trencher	2270002030	200	diesel	119	12	59%	8	9,327	0.02	0.23	0.07	1.47E-02	1.43E-02	4.01E-04	4.68E-03	140.71	1.30E-03	3.58E-03	141.81
Winch Truck	2270002051	250	diesel	111	12	59%	4	5,831	1.79E-03	0.02	4.57E-03	9.20E-04	8.93E-04	2.32E-04	4.30E-04	87.98	8.10E-05	2.24E-03	88.65
Cranes	2270002045	200	diesel	106	12	43%	8	6,726	7.87E-03	0.10	0.02	4.39E-03	4.26E-03	2.80E-04	1.89E-03	101.47	5.47E-04	2.58E-03	102.25
Forklifts	2270003020	75	diesel	109	12	59%	8	3,886	8.97E-04	0.09	7.96E-03	1.38E-03	1.34E-03	1.55E-04	2.17E-04	58.62	6.80E-05	1.49E-03	59.07
Skid Steer Loaders	2270002072	150	diesel	116	12	21%	4	1,447	0.04	0.19	0.12	0.02	0.02	8.02E-05	8.91E-03	21.82	1.85E-03	5.56E-04	22.03
Dump Truck (Side or belly dump)	-	-	diesel	302	-	-	16	2,845	6.09E-03	0.11	0.04	2.92E-03	2.68E-03	1.08E-04	-	32.02	7.13E-04	6.96E-05	32.06
Wind Turbine Assembly & Erection																			
Man Lift Bucket	2270003010	150	diesel	101	12	21%	40	14,511	0.13	0.86	0.45	0.09	0.09	6.74E-04	0.03	218.91	7.23E-03	5.57E-03	220.76
Forklift	2270003020	75	diesel	109	12	59%	20	9,714	0.00	0.22	0.02	3.46E-03	3.35E-03	3.87E-04	5.42E-04	146.55	1.70E-04	3.73E-03	147.67
Rough Terrain Cranes	2270002045	200	diesel	106	12	43%	50	42,036	0.05	0.60	0.14	0.03	0.03	1.75E-03	0.01	634.16	3.42E-03	0.02	639.06
Track mounted cranes	2270002045	200	diesel	106	12	43%	12	10,089	0.01	0.14	0.03	6.58E-03	6.39E-03	4.19E-04	2.84E-03	152.20	8.21E-04	3.88E-03	153.37
equip	-	-	diesel	301	-	-	252	42,838	5.75E-02	1.27	0.60	2.39E-02	0.02	1.62E-03	-	482.12	6.06E-03	5.44E-04	482.43
O&M Building																			
Excavators or Backhoes	2270002036	150	diesel	108	10	59%	12	8,747	4.37E-03	0.09	0.03	6.60E-03	6.40E-03	3.54E-04	1.06E-03	131.96	3.67E-04	3.36E-03	132.97
Forklifts	2270003020	75	diesel	109	10	59%	8	3,238	7.48E-04	0.07	6.64E-03	1.15E-03	1.12E-03	1.29E-04	1.81E-04	48.85	5.66E-05	1.24E-03	49.22
Skid Steer Loaders	2270002072	150	diesel	116	10	21%	16	4,822	0.12	0.65	0.40	0.07	0.07	2.67E-04	0.03	72.74	6.15E-03	1.85E-03	73.45
Air compressor	2270006015	50	diesel	102	10	43%	4	779	2.39E-03	0.06	1.19E-02	1.56E-03	1.52E-03	3.40E-05	5.74E-04	11.75	2.59E-04	2.99E-04	11.84
Project Cleanup																			
Front end loader	2270002060	150	diesel	115	12	59%	8	6,997	7.78E-03	0.10	0.04	8.33E-03	8.08E-03	2.89E-04	1.87E-03	105.55	6.16E-04	2.69E-03	106.37
Motor grader	2270002048	100	diesel	110	12	59%	8	4,665	3.62E-03	0.06	0.02	5.99E-03	5.81E-03	1.92E-04	8.74E-04	70.37	3.07E-04	1.79E-03	70.92
Dump Truck	-	-	diesel	302	-	-	8	1,423	3.04E-03	0.05	0.02	1.46E-03	1.34E-03	5.41E-05	-	16.01	3.57E-04	3.48E-05	16.03
Transportation Trucks - material/waste	-	-	diesel	301	-	-	12	2,040	2.74E-03	0.06	0.03	1.14E-03	1.05E-03	7.70E-05	-	22.96	2.89E-04	2.59E-05	22.97
Daily Construction Traffic																			
Full size pickups, FedEx, UPS, and otherdelivery trucks, etc. daily	-	-	diesel	305	-	-	1,080	67,465	0.36	2.25	2.48	0.08	0.07	2.57E-03	-	759.27	0.06	3.76E-03	761.82
Worker Commute																			
Light Commercial Truck	-	-	diesel	305	-	-	1,584	98,948	0.53	3.30	3.64	0.11	0.10	3.77E-03	-	1113.60	0.08	5.52E-03	1117.33
Passenger Car	-	-	gasoline	306	-	-	1,056	35,535	0.34	0.22	5.02	8.44E-03	7.47E-03	2.66E-03	-	399.92	0.03	6.30E-03	402.55
							Total	**675,415**	**3.03**	**24.66**	**17.83**	**1.34**	**1.29**	**0.03**	**0.40**	**9,093.78**	**0.29**	**0.17**	**9,150.72**

Notes:

1. Equipment assumptions based on information provided by the project.
2. Calculations assume equipment is used 5 days/wk - i.e., days/month.
3. Calculations conservatively assume that on-road vehicles travel approximately miles per day, since emission factors from the MOVES2014 model for on-road vehicles are based on miles traveled.
4. Calculations conservatively assume workers average daily round trip commute is approximately miles per day, since emission factors from the MOVES2014 model for on-road vehicles are based on miles traveled.
5. Nonroad emission factors for criteria pollutants and GHG were estimated using EPA's MOVES2014b emission model for an assumed construction year of 2023.
6. Nonroad emission factors for HAPs were estimated using ERG, "Documentation for Aircraft, Commercial Marine Vessel, Locomotive, and Other Nonroad Components of the National Emissions Inventory," Volume I - Methodology, October 7, 2
7. On-road vehicle emission factors (lb/VMT) for VOC, NOx, CO, PM10, SO2, and CO2e, were estimated using the MOVES2014b emission model for an assumed construction year of 2023.
8. On-road vehicle emission factors for HAP were not provided with the default MOVES input files for Benton County, but are presumed to be de minimis.

Adapted from Tables 2.15-2 through 2.15-4 of EFSEC ASC

Horse Heaven Wind Farm - Construction Emissions Phase 1 Solar (300 MW)

								Fuel Use	Emissions										
Construction Equipment	**Source Category**	**HP per unit**	**Fuel Type**	**Emiss. Factor ID**	**hrs per day**	**Load Factor**	**Total Equip. Months**	**gal**	**VOC tons**	**NO_X tons**	**CO tons**	**PM_{10} tons**	**$PM_{2.5}$ tons**	**SO_2 tons**	**HAP Tons**	**CO_2 tons**	**CH_4 tons**	**N_2O tons**	**CO_2e tons**
Site Prep & Road Const																			
Bulldozer	2270002069	200	diesel	107	12	59%	20	23,325	1.42E-02	0.17	0.06	1.27E-02	1.23E-02	9.48E-04	3.43E-03	351.88	9.77E-04	8.96E-03	354.58
Excavator / Backhoe	2270002036	150	diesel	108	12	59%	20	17,494	8.74E-03	0.18	0.06	1.32E-02	1.28E-02	7.07E-04	2.11E-03	263.92	7.35E-04	6.72E-03	265.94
Loader / Skid Steer loader	2270002072	150	diesel	116	12	21%	20	7,233	0.19	0.97	0.59	0.11	0.11	4.01E-04	0.04	109.11	9.23E-03	2.78E-03	110.17
Motor grader	2270002048	100	diesel	110	12	59%	20	11,662	9.04E-03	0.15	0.06	1.50E-02	0.01	4.80E-04	2.19E-03	175.94	7.67E-04	4.48E-03	177.29
Vibratory Roller	2270002015	75	diesel	114	12	59%	15	7,284	8.68E-03	0.23	0.08	1.06E-02	1.03E-02	3.01E-04	2.09E-03	109.89	6.40E-04	2.80E-03	110.74
Dump / Belly Truck	-	-	diesel	302	-	-	60	10,670	0.02	0.40	0.17	1.09E-02	1.01E-02	4.06E-04	-	120.08	2.67E-03	2.61E-04	120.23
Water Truck	-	-	diesel	304	-	-	40	4,136	0.02	0.09	0.06	2.06E-03	1.90E-03	1.56E-04	-	46.54	6.76E-03	2.70E-04	46.79
Fuel Truck	-	-	diesel	304	-	-	10	1,034	3.99E-03	0.02	0.01	5.16E-04	4.75E-04	3.90E-05	-	11.64	1.69E-03	6.74E-05	11.70
Pile Driving (Solar)																			
Telehandler	2270003010	150	diesel	101	12	21%	15	5,442	0.05	0.32	0.17	0.03	0.03	2.53E-04	1.19E-02	82.09	2.71E-03	2.09E-03	82.78
PD10 Pile Driver	2270002081	50	diesel	112	12	59%	25	8,090	0.03	0.61	0.19	0.02	0.02	3.46E-04	6.88E-03	122.05	2.64E-03	3.11E-03	123.04
Tracked Skidsteer	2270002072	150	diesel	116	12	21%	10	3,616	0.09	0.48	0.30	0.06	0.05	2.01E-04	0.02	54.56	4.62E-03	1.39E-03	55.09
Loader Tractor	2270002066	150	diesel	118	12	21%	5	1,811	0.03	0.18	0.10	0.02	0.02	9.50E-05	7.86E-03	27.32	2.06E-03	6.96E-04	27.58
Fuel Truck	-	-	diesel	304	12	-	5	517	1.99E-03	1.15E-02	7.09E-03	2.58E-04	2.37E-04	1.95E-05	-	5.82	8.45E-04	3.37E-05	5.85
Electrical																			
Dozer	2270002069	200	diesel	107	12	59%	4	4,665	2.84E-03	0.03	1.23E-02	2.53E-03	2.46E-03	1.90E-04	6.85E-04	70.38	1.95E-04	1.79E-03	70.92
Tracked Skidsteer	2270002072	150	diesel	116	12	21%	20	7,233	0.19	0.97	0.59	0.11	0.11	4.01E-04	0.04	109.11	9.23E-03	2.78E-03	110.17
Roller	2270002015	75	diesel	114	12	59%	8	3,885	4.63E-03	0.12	0.04	5.64E-03	5.47E-03	1.61E-04	1.12E-03	58.61	3.41E-04	1.49E-03	59.06
Towable Air Compressor	2270006015	50	diesel	102	12	43%	4	934	2.86E-03	0.07	1.42E-02	1.88E-03	1.82E-03	4.07E-05	6.89E-04	14.09	3.11E-04	3.59E-04	14.21
Motor Grader	2270002048	100	diesel	110	12	59%	4	2,332	1.81E-03	0.03	1.21E-02	2.99E-03	2.90E-03	9.60E-05	4.37E-04	35.19	1.53E-04	8.96E-04	35.46
Trench Padder	2270002072	175	diesel	116	12	21%	4	1,688	0.04	0.23	0.14	0.03	0.03	9.36E-05	1.04E-02	25.46	2.15E-03	6.48E-04	25.71
Utility Tractor	2270002066	150	diesel	118	12	21%	4	1,449	0.03	0.15	0.08	0.02	0.02	7.60E-05	6.28E-03	21.85	1.65E-03	5.57E-04	22.06
Telehandler	2270003010	150	diesel	101	12	21%	8	2,902	0.03	0.17	0.09	0.02	0.02	1.35E-04	6.34E-03	43.78	1.45E-03	1.11E-03	44.15
Boom Truck	2270003010	150	diesel	101	12	21%	12	4,353	0.04	0.26	0.13	0.03	0.03	2.02E-04	9.51E-03	65.67	2.17E-03	1.67E-03	66.23
Fork Truck for Spool Offload	2270003020	75	diesel	109	12	59%	8	3,886	8.97E-04	0.09	7.96E-03	1.38E-03	1.34E-03	1.55E-04	2.17E-04	58.62	6.80E-05	1.49E-03	59.07
Man Lift Bucket	2270003010	150	diesel	101	12	21%	8	2,902	0.03	0.17	0.09	0.02	0.02	1.35E-04	6.34E-03	43.78	1.45E-03	1.11E-03	44.15
Trencher	2270002030	200	diesel	119	12	59%	8	9,327	0.02	0.23	0.07	1.47E-02	0.01	4.01E-04	4.68E-03	140.71	1.30E-03	3.58E-03	141.81
Excavators / Backhoes	2270002036	150	diesel	108	12	59%	8	6,998	3.50E-03	0.07	0.02	5.28E-03	5.12E-03	2.83E-04	8.45E-04	105.57	2.94E-04	2.69E-03	106.38
Winch Truck	2270002051	250	diesel	111	12	59%	8	11,663	3.57E-03	0.04	9.14E-03	1.84E-03	1.79E-03	4.65E-04	8.60E-04	175.95	1.62E-04	4.48E-03	177.29
Water Truck	-	-	diesel	304	-		4	414	1.59E-03	9.21E-03	5.67E-03	2.06E-04	1.90E-04	1.56E-05	-	4.65	6.76E-04	2.70E-05	4.68
Transportation Trucks - materials	-	-	diesel	301	-	-	32	5,440	7.30E-03	0.16	0.08	3.04E-03	2.79E-03	2.05E-04	-	61.22	7.70E-04	6.91E-05	61.26
Substation																			
Backhoe or Excavator	2270002036	150	diesel	108	12	59%	8	6,998	3.50E-03	0.07	0.02	5.28E-03	5.12E-03	2.83E-04	8.45E-04	105.57	2.94E-04	2.69E-03	106.38
Bulldozer	2270002069	200	diesel	107	12	59%	8	9,330	5.69E-03	0.07	0.02	5.06E-03	4.91E-03	3.79E-04	1.37E-03	140.75	3.91E-04	3.58E-03	141.83
Concrete Trucks	2270002042	150	diesel	104	12	43%	16	10,067	0.13	1.44	0.37	0.08	0.07	5.58E-04	0.03	151.87	6.51E-03	3.87E-03	153.19
Drill Rig	2270002033	100	diesel	103	12	43%	8	3,356	0.04	0.47	0.12	0.03	0.03	1.86E-04	9.83E-03	50.63	2.28E-03	1.29E-03	51.07
Man Lift Bucket	2270003010	150	diesel	101	12	21%	8	2,902	0.03	0.17	0.09	0.02	0.02	1.35E-04	6.34E-03	43.78	1.45E-03	1.11E-03	44.15
Trencher	2270002030	200	diesel	119	12	59%	8	9,327	0.02	0.23	0.07	1.47E-02	1.43E-02	4.01E-04	4.68E-03	140.71	1.30E-03	3.58E-03	141.81
Winch Truck	2270002051	250	diesel	111	12	59%	4	5,831	1.79E-03	0.02	4.57E-03	9.20E-04	8.93E-04	2.32E-04	4.30E-04	87.98	8.10E-05	2.24E-03	88.65
Cranes	2270002045	200	diesel	106	12	43%	8	6,726	7.87E-03	0.10	0.02	4.39E-03	4.26E-03	2.80E-04	1.89E-03	101.47	5.47E-04	2.58E-03	102.25
Forklifts	2270003020	75	diesel	109	12	59%	8	3,886	8.97E-04	0.09	7.96E-03	1.38E-03	1.34E-03	1.55E-04	2.17E-04	58.62	6.80E-05	1.49E-03	59.07
Skid Steer Loaders	2270002072	150	diesel	116	12	21%	4	1,447	0.04	0.19	0.12	0.02	0.02	8.02E-05	8.91E-03	21.82	1.85E-03	5.56E-04	22.03
Dump Truck (Side or belly dump)	-	-	diesel	302	-	-	16	2,845	6.09E-03	0.11	0.04	2.92E-03	2.68E-03	1.08E-04	-	32.02	7.13E-04	6.96E-05	32.06
Solar Panel Installation																			
Tracked Skidsteer	2270002072	175	diesel	116	12	21%	25	10,548	0.27	1.41	0.87	0.16	0.16	5.85E-04	0.06	159.12	1.35E-02	4.05E-03	160.67
Loader	2270002060	150	diesel	115	12	59%	5	4,373	4.86E-03	0.06	0.02	5.21E-03	5.05E-03	1.81E-04	1.17E-03	65.97	3.85E-04	1.68E-03	66.48
Telehandler	2270003010	150	diesel	101	12	21%	15	5,442	0.05	0.32	0.17	0.03	0.03	2.53E-04	1.19E-02	82.09	2.71E-03	2.09E-03	82.78
Project Cleanup																			
Telehandler	2270003010	150	diesel	101	12	21%	10	3,628	0.03	0.21	0.11	0.02	0.02	1.69E-04	7.92E-03	54.73	1.81E-03	1.39E-03	55.19
Tracked Skidsteer	2270002072	150	diesel	116	12	21%	20	7,233	0.19	0.97	0.59	0.11	0.11	4.01E-04	0.04	109.11	9.23E-03	2.78E-03	110.17
Transportation Trucks - material/waste	-	-	diesel	301	-	-	9	1,530	2.05E-03	0.05	0.02	8.54E-04	7.86E-04	5.78E-05	-	17.22	2.16E-04	1.94E-05	17.23
Daily Construction Traffic																			
Full size pickups, FedEx, UPS, andother delivery trucks, etc. daily	-	-	diesel	305	-	-	900	56,221	0.30	1.88	2.07	0.06	0.06	2.14E-03	-	632.73	0.05	3.14E-03	634.85
Buggies	-	-	gasoline	306	-	-	384	12,922	0.12	0.08	1.83	3.07E-03	2.72E-03	9.66E-04	-	145.43	1.09E-02	2.29E-03	146.38
Busses	-	-	diesel	303	-	-	72	6,857	0.01	0.14	0.09	3.08E-03	2.84E-03	2.59E-04	-	77.17	1.75E-03	2.61E-04	77.30
							Total	**343,847**	**2.12**	**14.67**	**9.94**	**1.15**	**1.11**	**0.02**	**0.39**	**4,794.30**	**0.16**	**0.10**	**4,827.91**

Notes:
1. Equipment assumptions based on information provided by the project.
2. Calculations assume equipment is used 5 days/wk - i.e. days/month.
3. Calculations conservatively assume that on-road vehicles travel approximately miles per day, since emission factors from the MOVES2014 model for on-road vehicles are based on miles traveled.
4. Calculations conservatively assume workers average daily round trip commute is approximately miles per day, since emission factors from the MOVES2014 model for on-road vehicles are based on miles traveled.
5. Nonroad emission factors for criteria pollutants and GHG were estimated using EPA's MOVES2014b emission model for an assumed construction year of 2023.
6. Nonroad emission factors for HAPs were estimated using ERG, "Documentation for Aircraft, Commercial Marine Vessel, Locomotive, and Other Nonroad Components of the National Emissions Inventory," Volume I - Methodology, October
7. On-road vehicle emission factors (lb/VMT) for VOC, NOx, CO, PM10, SO2, and CO2e, were estimated using the MOVES2014b emission model for an assumed construction year of 2023.
8. On-road vehicle emission factors for HAP were not provided with the default MOVES input files for Benton County, but are presumed to be de minimis.

Adapted from Tables 2.15-2 through 2.15-4 of EFSEC ASC

Horse Heaven Wind Farm - Construction Emissions Phase 1 Battery (150 MW)

Construction Equipment	Source Category	HP per unit	Fuel Type	Emiss. Factor ID	hrs per day	Load Factor	Total Equip. Months	Fuel Use gal	Emissions VOC tons	NO_X tons	CO tons	PM_{10} tons	$PM_{2.5}$ tons	SO_2 tons	HAP Tons	CO_2 tons	CH_4 tons	N_2O tons	CO_2e tons
Site Prep & Road Const																			
Bulldozer	2270002069	200	diesel	107	12	59%	4	4,665	2.84E-03	0.03	1.23E-02	2.53E-03	2.46E-03	1.90E-04	6.85E-04	70.38	1.95E-04	1.79E-03	70.92
Excavator / Backhoe	2270002036	150	diesel	108	12	59%	4	3,499	1.75E-03	0.04	1.14E-02	2.64E-03	2.56E-03	1.41E-04	4.22E-04	52.78	1.47E-04	1.34E-03	53.19
Loader / Skid Steer loader	2270002072	150	diesel	116	12	21%	2	723	0.02	0.10	0.06	1.12E-02	1.08E-02	4.01E-05	4.46E-03	10.91	9.23E-04	2.78E-04	11.02
Motor grader	2270002048	100	diesel	110	12	59%	2	1,166	9.04E-04	1.49E-02	6.04E-03	1.50E-03	1.45E-03	4.80E-05	2.19E-04	17.59	7.67E-05	4.48E-04	17.73
Vibratory Roller	2270002015	75	diesel	114	12	59%	2	971	1.16E-03	0.03	1.10E-02	1.41E-03	1.37E-03	4.01E-05	2.79E-04	14.65	8.53E-05	3.73E-04	14.77
Dump / Belly Truck	-	-	diesel	302	-	-	4	711	1.52E-03	0.03	1.11E-02	7.29E-04	6.71E-04	2.71E-05	-	8.01	1.78E-04	1.74E-05	8.02
Water Truck	-	-	diesel	304	-	-	2	207	7.97E-04	4.60E-03	2.84E-03	1.03E-04	9.50E-05	7.80E-06	-	2.33	3.38E-04	1.35E-05	2.34
Fuel Truck	-	-	diesel	304	-	-	2	207	7.97E-04	4.60E-03	2.84E-03	1.03E-04	9.50E-05	7.80E-06	-	2.33	3.38E-04	1.35E-05	2.34
Foundation																			
Rough Terrain Cranes	2270002045	200	diesel	106	12	43%	2	1,681	1.97E-03	0.02	5.50E-03	1.10E-03	1.06E-03	6.99E-05	4.73E-04	25.37	1.37E-04	6.46E-04	25.56
Concrete Truck	2270002042	150	diesel	104	12	43%	8	5,034	0.06	0.72	0.19	0.04	0.04	2.79E-04	0.02	75.94	3.25E-03	1.93E-03	76.59
Backhoe or Excavator	2270002036	150	diesel	108	12	59%	4	3,499	1.75E-03	0.04	1.14E-02	2.64E-03	2.56E-03	1.41E-04	4.22E-04	52.78	1.47E-04	1.34E-03	53.19
Forklifts	2270003020	75	diesel	109	12	59%	4	1,943	4.49E-04	0.04	3.98E-03	6.91E-04	6.71E-04	7.74E-05	1.08E-04	29.31	3.40E-05	7.46E-04	29.53
Skid Steer loader	2270002072	150	diesel	116	12	21%	2	723	0.02	0.10	0.06	1.12E-02	1.08E-02	4.01E-05	4.46E-03	10.91	9.23E-04	2.78E-04	11.02
Dump Truck	-	-	diesel	302	-	-	4	711	1.52E-03	0.03	1.11E-02	7.29E-04	6.71E-04	2.71E-05	-	8.01	1.78E-04	1.74E-05	8.02
Transportation Trucks - materials	-	-	diesel	301	-	-	4	680	9.12E-04	0.02	9.58E-03	3.80E-04	3.49E-04	2.57E-05	-	7.65	9.62E-05	8.63E-06	7.66
Water Truck	-	-	diesel	304	-	-	2	207	7.97E-04	4.60E-03	2.84E-03	1.03E-04	9.50E-05	7.80E-06	-	2.33	3.38E-04	1.35E-05	2.34
Fuel Truck	-	-	diesel	304	-	-	2	207	7.97E-04	4.60E-03	2.84E-03	1.03E-04	9.50E-05	7.80E-06	-	2.33	3.38E-04	1.35E-05	2.34
Electrical																			
Boom Truck	2270003010	150	diesel	101	12	21%	2	726	6.59E-03	0.04	0.02	4.45E-03	4.32E-03	3.37E-05	1.58E-03	10.95	3.62E-04	2.79E-04	11.04
Fork Truck for Spool Offload	2270003020	75	diesel	109	12	59%	2	971	2.24E-04	0.02	1.99E-03	3.46E-04	3.35E-04	3.87E-05	5.42E-05	14.65	1.70E-05	3.73E-04	14.77
Man Lift Bucket	2270003010	150	diesel	101	12	21%	2	726	6.59E-03	0.04	0.02	4.45E-03	4.32E-03	3.37E-05	1.58E-03	10.95	3.62E-04	2.79E-04	11.04
Trencher	2270002030	200	diesel	119	12	59%	2	2,332	4.87E-03	0.06	0.02	3.67E-03	3.56E-03	1.00E-04	1.17E-03	35.18	3.26E-04	8.96E-04	35.45
Excavators / Backhoes	2270002036	150	diesel	108	12	59%	2	1,749	8.74E-04	0.02	5.72E-03	1.32E-03	1.28E-03	7.07E-05	2.11E-04	26.39	7.35E-05	6.72E-04	26.59
Transportation Trucks - materials	-	-	diesel	301	-	-	4	680	9.12E-04	0.02	9.58E-03	3.80E-04	3.49E-04	2.57E-05	-	7.65	9.62E-05	8.63E-06	7.66
Project Cleanup																			
Front end loader	2270002060	150	diesel	115	12	59%	1	875	9.72E-04	1.22E-02	4.79E-03	1.04E-03	1.01E-03	3.61E-05	2.34E-04	13.19	7.69E-05	3.36E-04	13.30
Motor grader	2270002048	100	diesel	110	12	59%	1	583	4.52E-04	7.43E-03	3.02E-03	7.49E-04	7.26E-04	2.40E-05	1.09E-04	8.80	3.84E-05	2.24E-04	8.86
Dump Truck	-	-	diesel	302	-	-	1	178	3.80E-04	6.63E-03	2.79E-03	1.82E-04	1.68E-04	6.76E-06	-	2.00	4.46E-05	4.35E-06	2.00
Transportation Trucks - material/waste	-	-	diesel	301	-	-	1	170	2.28E-04	5.05E-03	2.39E-03	9.49E-05	8.73E-05	6.42E-06	-	1.91	2.41E-05	2.16E-06	1.91
Daily Construction Traffic																			
Full size pickups, FedEx, UPS, and otherdelivery trucks, etc. daily	-	-	diesel	305	-	-	400	24,987	0.13	0.83	0.92	0.03	0.03	9.53E-04	-	281.21	0.02	1.39E-03	282.16
							Total	**60,810**	**0.27**	**2.29**	**1.42**	**0.12**	**0.11**	**2.51E-03**	**0.03**	**806.49**	**0.03**	**1.37E-02**	**811.34**

Notes:

1. Equipment assumptions based on information provided by the project.
2. Calculations assume equipment is used 5 days/wk - i.e., days/month.
3. Calculations conservatively assume that on-road vehicles travel approximately miles per day, since emission factors from the MOVES2014 model for on-road vehicles are based on miles traveled.
4. Calculations conservatively assume workers average daily round trip commute is approximately miles per day, since emission factors from the MOVES2014 model for on-road vehicles are based on miles traveled.
5. Nonroad emission factors for criteria pollutants and GHG were estimated using EPA's MOVES2014b emission model for an assumed construction year of 2023.
6. Nonroad emission factors for HAPs were estimated using ERG, "Documentation for Aircraft, Commercial Marine Vessel, Locomotive, and Other Nonroad Components of the National Emissions Inventory," Volume I - Methodology, October 7,
7. On-road vehicle emission factors (lb/VMT) for VOC, NOx, CO, PM10, SO2, and CO2e, were estimated using the MOVES2014b emission model for an assumed construction year of 2023.
8. On-road vehicle emission factors for HAP were not provided with the default MOVES input files for Benton County, but are presumed to be de minimis.

Adapted from Tables 2.15-2 through 2.15-4 of EFSEC ASC

Horse Heaven Wind Farm - Construction Emissions Phase 2a Wind (250 MW)

								Fuel Use	Emissions									
Construction Equipment	**Source Category**	**HP per unit**	**Fuel Type**	**Emiss. Factor ID**	**hrs per day**	**Load Factor**	**Total Equip. Months**	**gal**	**VOC tons**	**NO_X tons**	**CO tons**	**PM_{10} tons**	**$^{PM}2.5$ tons**	**SO_2 tons**	**HAP Tons**	**CO_2 tons**	**CH_4 tons**	**N_2O tons**	**CO_2e tons**
Site Prep & Road Const																			
Bulldozer	2270002069	200	diesel	207	12	59%	32	37,320	0.02	0.22	0.07	1.43E-02	1.39E-02	1.50E-03	4.34E-03	563.02	1.13E-03	1.43E-02	567.33
Excavator / Backhoe	2270002036	150	diesel	208	12	59%	32	27,991	1.09E-02	0.23	0.07	0.02	1.47E-02	1.12E-03	2.62E-03	422.28	8.82E-04	1.08E-02	425.50
Loader / Skid Steer loader	2270002072	150	diesel	216	12	21%	32	11,573	0.29	1.53	0.94	0.18	0.17	6.42E-04	0.07	174.59	0.02	4.45E-03	176.30
Motor grader	2270002048	100	diesel	210	12	59%	32	18,660	1.02E-02	0.18	0.07	0.02	0.02	7.57E-04	2.46E-03	281.51	8.44E-04	7.17E-03	283.67
Vibratory Roller	2270002015	75	diesel	214	12	59%	24	11,655	1.02E-02	0.33	0.10	1.34E-02	1.30E-02	4.77E-04	2.47E-03	175.84	7.92E-04	4.48E-03	177.19
Dump / Belly Truck	-	-	diesel	402	-	-	96	16,839	0.03	0.59	0.26	1.44E-02	1.33E-02	6.39E-04	-	189.51	4.20E-03	4.17E-04	189.74
Water Truck	-	-	diesel	404	-	-	64	6,497	0.02	0.14	0.09	2.81E-03	2.58E-03	2.45E-04	-	73.12	1.08E-02	4.31E-04	73.52
Fuel Truck	-	-	diesel	404	-	-	16	1,624	6.06E-03	0.03	0.02	7.01E-04	6.45E-04	6.12E-05	-	18.28	2.70E-03	1.08E-04	18.38
Foundation																			
Rough Terrain Cranes	2270002045	200	diesel	206	12	43%	12	10,089	9.11E-03	0.11	0.03	5.07E-03	4.92E-03	4.14E-04	2.19E-03	152.21	6.27E-04	3.88E-03	153.38
Concrete pump truck	2270002042	200	diesel	205	12	43%	8	6,713	0.07	0.89	0.22	0.04	0.04	3.72E-04	0.02	101.28	3.78E-03	2.58E-03	102.14
Concrete Truck	2270002042	150	diesel	204	12	43%	64	40,269	0.50	5.69	1.47	0.30	0.29	2.23E-03	0.12	607.51	0.03	0.02	612.79
Backhoe or Excavator	2270002036	150	diesel	208	12	59%	16	13,995	5.43E-03	0.12	0.03	7.55E-03	7.33E-03	5.62E-04	1.31E-03	211.14	4.41E-04	5.38E-03	212.75
Forklifts	2270003020	75	diesel	209	12	59%	12	5,828	1.19E-03	0.13	9.02E-03	1.62E-03	1.57E-03	2.32E-04	2.88E-04	87.93	8.72E-05	2.24E-03	88.60
Skid Steer loader	2270002072	150	diesel	216	12	21%	8	2,893	0.07	0.38	0.23	0.04	0.04	1.60E-04	0.02	43.65	3.78E-03	1.11E-03	44.07
Dump Truck	-	-	diesel	402	-	-	24	4,210	8.02E-03	0.15	0.06	3.61E-03	3.32E-03	1.60E-04	-	47.38	1.05E-03	1.04E-04	47.43
Transportation Trucks - materials	-	-	diesel	401	-	-	24	3,993	5.07E-03	0.11	0.06	1.98E-03	1.83E-03	1.51E-04	-	44.94	5.54E-04	5.18E-05	44.97
Water Truck	-	-	diesel	404	-	-	12	1,218	4.55E-03	0.03	0.02	5.26E-04	4.84E-04	4.59E-05	-	13.71	2.02E-03	8.08E-05	13.79
Fuel Truck	-	-	diesel	404	-	-	8	812	3.03E-03	0.02	1.10E-02	3.51E-04	3.23E-04	3.06E-05	-	9.14	1.35E-03	5.39E-05	9.19
Electrical																			
Boom Truck	2270003010	150	diesel	201	12	21%	8	2,903	0.02	0.16	0.08	0.02	0.02	1.33E-04	5.78E-03	43.79	1.36E-03	1.12E-03	44.16
Fork Truck for Spool Offload	2270003020	75	diesel	209	12	59%	12	5,828	1.19E-03	0.13	9.02E-03	1.62E-03	1.57E-03	2.32E-04	2.88E-04	87.93	8.72E-05	2.24E-03	88.60
Man Lift Bucket	2270003010	150	diesel	201	12	21%	12	4,354	0.04	0.24	0.12	0.02	0.02	2.00E-04	8.67E-03	65.68	2.04E-03	1.67E-03	66.23
Trencher	2270002030	200	diesel	219	12	59%	12	13,992	0.02	0.29	0.09	0.02	0.02	5.93E-04	5.88E-03	211.08	1.64E-03	5.38E-03	212.73
Excavators / Backhoes	2270002036	150	diesel	208	12	59%	12	10,497	4.07E-03	0.09	0.03	5.66E-03	5.49E-03	4.21E-04	9.84E-04	158.35	3.31E-04	4.03E-03	159.56
Winch Truck	2270002051	250	diesel	211	12	59%	8	11,663	3.34E-03	0.04	0.01	1.56E-03	1.51E-03	4.64E-04	8.05E-04	175.95	1.41E-04	4.48E-03	177.29
Transportation Trucks - materials	-	-	diesel	401	-	-	32	5,324	6.76E-03	0.15	0.07	2.65E-03	2.43E-03	2.01E-04	-	59.91	7.39E-04	6.91E-05	59.95
Substation																			
Backhoe or Excavator	2270002036	150	diesel	208	12	59%	20	17,494	6.79E-03	0.14	0.04	9.44E-03	9.16E-03	7.02E-04	1.64E-03	263.92	5.52E-04	6.72E-03	265.94
Bulldozer	2270002069	200	diesel	207	12	59%	20	23,325	1.13E-02	0.13	0.04	8.96E-03	8.69E-03	9.40E-04	2.71E-03	351.89	7.09E-04	8.96E-03	354.58
Concrete Trucks	2270002042	150	diesel	204	12	43%	40	25,168	0.31	3.56	0.92	0.19	0.18	1.40E-03	0.07	379.70	0.02	9.67E-03	382.99
Drill Rig	2270002033	100	diesel	203	12	43%	20	8,390	0.10	1.14	0.29	0.07	0.06	4.63E-04	0.02	126.58	5.67E-03	3.22E-03	127.68
Man Lift Bucket	2270003010	150	diesel	201	12	21%	20	7,256	0.06	0.39	0.20	0.04	0.04	3.34E-04	1.44E-02	109.47	3.40E-03	2.79E-03	110.39
Trencher	2270002030	200	diesel	219	12	59%	20	23,320	0.04	0.48	0.15	0.03	0.03	9.89E-04	9.81E-03	351.81	2.73E-03	8.96E-03	354.55
Winch Truck	2270002051	250	diesel	211	12	59%	10	14,579	4.18E-03	0.05	9.67E-03	1.95E-03	1.89E-03	5.80E-04	1.01E-03	219.94	1.76E-04	5.60E-03	221.61
Cranes	2270002045	200	diesel	206	12	43%	20	16,815	0.02	0.18	0.04	8.45E-03	8.19E-03	6.91E-04	3.65E-03	253.68	1.05E-03	6.46E-03	255.63
Forklifts	2270003020	75	diesel	209	12	59%	20	9,714	1.98E-03	0.21	0.02	2.70E-03	2.62E-03	3.86E-04	4.79E-04	146.55	1.45E-04	3.73E-03	147.67
Skid Steer Loaders	2270002072	150	diesel	216	12	21%	10	3,617	0.09	0.48	0.29	0.06	0.05	2.01E-04	0.02	54.56	4.73E-03	1.39E-03	55.09
Dump Truck (Side or belly dump)	-	-	diesel	402	-	-	40	7,016	1.34E-02	0.24	0.11	6.02E-03	5.54E-03	2.66E-04	-	78.96	1.75E-03	1.74E-04	79.06
Wind Turbine Assembly & Erection																			
Man Lift Bucket	2270003010	150	diesel	201	12	21%	40	14,513	0.12	0.79	0.41	0.08	0.08	6.67E-04	0.03	218.95	6.81E-03	5.58E-03	220.78
Forklift	2270003020	75	diesel	209	12	59%	20	9,714	1.98E-03	0.21	0.02	2.70E-03	2.62E-03	3.86E-04	4.79E-04	146.55	1.45E-04	3.73E-03	147.67
Rough Terrain Cranes	2270002045	200	diesel	206	12	43%	50	42,038	0.04	0.46	0.11	0.02	0.02	1.73E-03	9.13E-03	634.19	2.61E-03	0.02	639.07
Track mounted cranes	2270002045	200	diesel	206	12	43%	12	10,089	9.11E-03	0.11	0.03	5.07E-03	4.92E-03	4.14E-04	2.19E-03	152.21	6.27E-04	3.88E-03	153.38
rials & equip	-	-	diesel	401	-	-	252	41,924	5.32E-02	1.19	0.58	0.02	0.02	1.58E-03	-	471.83	5.82E-03	5.44E-04	472.13
Transmission Line																			
Cranes	2270002045	200	diesel	206	8	43%	8	4,484	4.05E-03	0.05	1.14E-02	2.25E-03	2.18E-03	1.84E-04	9.74E-04	67.65	2.79E-04	1.72E-03	68.17
Bucket Trucks	2270003010	150	diesel	201	8	21%	20	4,838	0.04	0.26	0.14	0.03	0.03	2.22E-04	9.63E-03	72.98	2.27E-03	1.86E-03	73.59
Wire Pullers	2270002081	100	diesel	213	6	59%	6	1,749	3.26E-03	0.04	1.35E-02	2.86E-03	2.78E-03	7.38E-05	7.86E-04	26.38	2.38E-04	6.72E-04	26.59
Wire Tensioners	2270002081	100	diesel	213	6	59%	6	1,749	3.26E-03	0.04	1.35E-02	2.86E-03	2.78E-03	7.38E-05	7.86E-04	26.38	2.38E-04	6.72E-04	26.59
Excavators or Backhoes	2270002036	150	diesel	208	4	59%	18	5,248	2.04E-03	0.04	1.31E-02	2.83E-03	2.75E-03	2.11E-04	4.92E-04	79.18	1.65E-04	2.02E-03	79.78
Forklifts	2270003020	75	diesel	209	4	59%	12	1,943	3.97E-04	0.04	3.01E-03	5.41E-04	5.25E-04	7.73E-05	9.59E-05	29.31	2.91E-05	7.46E-04	29.53
Truck / track diggers	2270002036	150	diesel	208	6	59%	4	1,749	6.79E-04	1.45E-02	4.35E-03	9.44E-04	9.16E-04	7.02E-05	1.64E-04	26.39	5.52E-05	6.72E-04	26.59
Dozers	2270002069	200	diesel	207	4	59%	5	1,944	9.39E-04	1.12E-02	3.64E-03	7.47E-04	7.24E-04	7.83E-05	2.26E-04	29.32	5.91E-05	7.47E-04	29.55
UTVs	2270001060	75	diesel	217	2	21%	6	201	2.68E-03	0.02	1.32E-02	1.79E-03	1.74E-03	9.71E-06	6.44E-04	3.04	1.07E-04	7.73E-05	3.06
Tractor	2270002066	150	diesel	218	6	21%	4	725	1.13E-02	0.06	0.04	7.33E-03	7.11E-03	3.68E-05	2.72E-03	10.93	7.19E-04	2.78E-04	11.03
Skid Steer Loaders	2270002072	150	diesel	216	6	21%	12	2,170	0.05	0.29	0.18	0.03	0.03	1.20E-04	1.32E-02	32.74	2.84E-03	8.34E-04	33.06
Underground boring equipment	2270002033	100	diesel	203	8	43%	12	3,356	0.04	0.45	0.12	0.03	0.03	1.85E-04	9.55E-03	50.63	2.27E-03	1.29E-03	51.07
Tractor Trailers	-	-	diesel	401	-	-	6	998	1.27E-03	0.03	1.39E-02	4.96E-04	4.56E-04	3.76E-05	-	11.23	1.39E-04	1.30E-05	11.24
Fuel Trucks / Trailers	-	-	diesel	404	-	-	6	609	2.27E-03	1.29E-02	8.23E-03	2.63E-04	2.42E-04	2.30E-05	-	6.86	1.01E-03	4.04E-05	6.89

Adapted from Tables 2.15-2 through 2.15-4 of EFSEC ASC

Horse Heaven Wind Farm - Construction Emissions Phase 2a Wind (250 MW)

								Fuel Use	Emissions										
Construction Equipment	**Source Category**	**HP per unit**	**Fuel Type**	**Emiss. Factor ID**	**hrs per day**	**Load Factor**	**Total Equip. Months**	**gal**	**VOC tons**	**NO_X tons**	**CO tons**	**PM_{10} tons**	**$^{PM}2.5$ tons**	**SO_2 tons**	**HAP Tons**	**CO_2 tons**	**CH_4 tons**	**N_2O tons**	**CO_2e tons**
O&M Building																			
Excavators or Backhoes	2270002036	150	diesel	208	10	59%	12	8,747	3.39E-03	0.07	0.02	4.72E-03	4.58E-03	3.51E-04	8.20E-04	131.96	2.76E-04	3.36E-03	132.97
Forklifts	2270003020	75	diesel	209	10	59%	8	3,238	6.61E-04	0.07	5.01E-03	9.01E-04	8.74E-04	1.29E-04	1.60E-04	48.85	4.85E-05	1.24E-03	49.22
Skid Steer Loaders	2270002072	150	diesel	216	10	21%	16	4,822	0.12	0.64	0.39	0.07	0.07	2.67E-04	0.03	72.75	6.31E-03	1.85E-03	73.46
Air compressor	2270006015	50	diesel	202	10	43%	4	779	2.14E-03	0.06	1.04E-02	1.32E-03	1.28E-03	3.34E-05	5.14E-04	11.75	2.47E-04	2.99E-04	11.84
Project Cleanup																			
Front end loader	2270002060	150	diesel	215	12	59%	8	6,997	5.91E-03	0.08	0.03	6.87E-03	6.66E-03	2.86E-04	1.43E-03	105.56	4.68E-04	2.69E-03	106.37
Motor grader	2270002048	100	diesel	210	12	59%	8	4,665	2.55E-03	0.04	0.02	3.95E-03	3.84E-03	1.89E-04	6.16E-04	70.38	2.11E-04	1.79E-03	70.92
Dump Truck	-	-	diesel	402	-	-	8	1,403	2.67E-03	0.05	0.02	1.20E-03	1.11E-03	5.32E-05	-	15.79	3.50E-04	3.48E-05	15.81
aterial/waste	-	-	diesel	401	-	-	12	1,996	2.53E-03	0.06	0.03	9.92E-04	9.13E-04	7.53E-05	-	22.47	2.77E-04	2.59E-05	22.48
Daily Construction Traffic																			
Full size pickups, FedEx, UPS, and other delivery trucks, etc. daily	-	-	diesel	405	-	-	1,400	84,833	0.41	2.58	2.79	0.09	0.09	3.23E-03	-	954.75	0.07	4.88E-03	958.05
Worker Commute																			
Light Commercial Truck	-	-	diesel	405	-	-	1,412	85,560	0.41	2.60	2.82	0.10	0.09	3.26E-03	-	962.93	0.07	4.92E-03	966.26
Passenger Car	-	-	gasoline	406	-	-	942	30,938	0.28	0.16	4.33	7.47E-03	6.61E-03	2.31E-03	-	348.19	0.02	5.36E-03	350.41
							Total	**817,455**	**3.47**	**29.48**	**18.44**	**1.68**	**1.62**	**0.04**	**0.53**	**11,198.93**	**0.33**	**0.22**	**11,272.03**

Notes:

1. Equipment assumptions based on information provided by the project.
2. Calculations assume equipment is used 5 days/wk - i.e., days/month.
3. Calculations conservatively assume that on-road vehicles travel approximately miles per day, since emission factors from the MOVES2014 model for on-road vehicles are based on miles traveled.
4. Calculations conservatively assume workers average daily round trip commute is approximately miles per day, since emission factors from the MOVES2014 model for on-road vehicles are based on miles traveled.
5. Nonroad emission factors for criteria pollutants and GHG were estimated using EPA's MOVES2014b emission model for an assumed construction year of 2024.
6. Nonroad emission factors for HAPs were estimated using ERG, "Documentation for Aircraft, Commercial Marine Vessel, Locomotive, and Other Nonroad Components of the National Emissions Inventory," Volume I - Methodology, October 7, 2
7. On-road vehicle emission factors (lb/VMT) for VOC, NOx, CO, PM10, SO2, and CO2e, were estimated using the MOVES2014b emission model for an assumed construction year of 2024.
8. On-road vehicle emission factors for HAP were not provided with the default MOVES input files for Benton County, but are presumed to be de minimis.

Adapted from Tables 2.15-2 through 2.15-4 of EFSEC ASC

Horse Heaven Wind Farm - Construction Emissions Phase 2a Solar (250 MW)

								Fuel Use	Emissions										
Construction Equipment	**Source Category**	**HP per unit**	**Fuel Type**	**Emiss. Factor ID**	**hrs per day**	**Load Factor**	**Total Equip. Months**	**gal**	**VOC tons**	**NO_x tons**	**CO tons**	**PM_{10} tons**	**$PM_{2.5}$ tons**	**SO_2 tons**	**HAP Tons**	**CO_2 tons**	**CH_4 tons**	**N_2O tons**	**CO_2e tons**
Site Prep & Road Const																			
Bulldozer	2270002069	200	diesel	207	12	59%	16	18,660	9.01E-03	0.11	0.03	7.17E-03	6.95E-03	7.52E-04	2.17E-03	281.51	5.67E-04	7.17E-03	283.66
Excavator / Backhoe	2270002036	150	diesel	208	12	59%	16	13,995	5.43E-03	0.12	0.03	7.55E-03	7.33E-03	5.62E-04	1.31E-03	211.14	4.41E-04	5.38E-03	212.75
Loader / Skid Steer loader	2270002072	150	diesel	216	12	21%	16	5,787	0.15	0.76	0.47	0.09	0.09	3.21E-04	0.04	87.30	7.57E-03	2.22E-03	88.15
Motor grader	2270002048	100	diesel	210	12	59%	16	9,330	5.10E-03	0.09	0.03	7.91E-03	7.67E-03	3.78E-04	1.23E-03	140.75	4.22E-04	3.58E-03	141.83
Vibratory Roller	2270002015	75	diesel	214	12	59%	12	5,828	5.11E-03	0.17	0.05	6.72E-03	6.52E-03	2.38E-04	1.23E-03	87.92	3.96E-04	2.24E-03	88.60
Dump / Belly Truck	-	-	diesel	402	-	-	48	8,419	0.02	0.29	0.13	7.22E-03	6.64E-03	3.19E-04	-	94.76	2.10E-03	2.09E-04	94.87
Water Truck	-	-	diesel	404	-	-	32	3,249	1.21E-02	0.07	0.04	1.40E-03	1.29E-03	1.22E-04	-	36.56	5.39E-03	2.15E-04	36.76
Fuel Truck	-	-	diesel	404	-	-	8	812	3.03E-03	0.02	1.10E-02	3.51E-04	3.23E-04	3.06E-05	-	9.14	1.35E-03	5.39E-05	9.19
Pile Driving (Solar)																			
Telehandler	2270003010	150	diesel	201	12	21%	15	5,442	0.05	0.29	0.15	0.03	0.03	2.50E-04	1.08E-02	82.11	2.55E-03	2.09E-03	82.79
PD10 Pile Driver	2270002081	50	diesel	212	12	59%	25	8,090	0.03	0.59	0.16	0.02	0.02	3.42E-04	6.04E-03	122.06	2.50E-03	3.11E-03	123.04
Tracked Skidsteer	2270002072	150	diesel	216	12	21%	10	3,617	0.09	0.48	0.29	0.06	0.05	2.01E-04	0.02	54.56	4.73E-03	1.39E-03	55.09
Loader Tractor	2270002066	150	diesel	218	12	21%	5	1,812	0.03	0.16	0.09	0.02	0.02	9.21E-05	6.79E-03	27.33	1.80E-03	6.96E-04	27.58
Fuel Truck	-	-	diesel	404	-	-	5	508	1.89E-03	1.08E-02	6.86E-03	2.19E-04	2.02E-04	1.91E-05	-	5.71	8.43E-04	3.37E-05	5.74
Electrical																			
Dozer	2270002069	200	diesel	207	12	59%	4	4,665	2.25E-03	0.03	8.73E-03	1.79E-03	1.74E-03	1.88E-04	5.43E-04	70.38	1.42E-04	1.79E-03	70.92
Tracked Skidsteer	2270002072	150	diesel	216	12	21%	20	7,233	0.18	0.96	0.58	0.11	0.11	4.01E-04	0.04	109.12	9.46E-03	2.78E-03	110.19
Roller	2270002015	75	diesel	214	12	59%	8	3,885	3.41E-03	0.11	0.03	4.48E-03	4.34E-03	1.59E-04	8.22E-04	58.61	2.64E-04	1.49E-03	59.06
Towable Air Compressor	2270006015	50	diesel	202	12	43%	4	934	2.56E-03	0.07	1.25E-02	1.59E-03	1.54E-03	4.00E-05	6.16E-04	14.10	2.96E-04	3.59E-04	14.21
Motor Grader	2270002048	100	diesel	210	12	59%	4	2,332	1.27E-03	0.02	8.38E-03	1.98E-03	1.92E-03	9.46E-05	3.08E-04	35.19	1.05E-04	8.96E-04	35.46
Trench Padder	2270002072	175	diesel	216	12	21%	4	1,688	0.04	0.22	0.14	0.03	0.02	9.36E-05	1.03E-02	25.46	2.21E-03	6.48E-04	25.71
Utility Tractor	2270002066	150	diesel	218	12	21%	4	1,449	0.02	0.13	0.07	1.47E-02	1.42E-02	7.37E-05	5.43E-03	21.86	1.44E-03	5.57E-04	22.07
Telehandler	2270003010	150	diesel	201	12	21%	8	2,903	0.02	0.16	0.08	0.02	0.02	1.33E-04	5.78E-03	43.79	1.36E-03	1.12E-03	44.16
Boom Truck	2270003010	150	diesel	201	12	21%	12	4,354	0.04	0.24	0.12	0.02	0.02	2.00E-04	8.67E-03	65.68	2.04E-03	1.67E-03	66.23
Fork Truck for Spool Offload	2270003020	75	diesel	209	12	59%	8	3,886	7.93E-04	0.08	6.01E-03	1.08E-03	1.05E-03	1.55E-04	1.92E-04	58.62	5.81E-05	1.49E-03	59.07
Man Lift Bucket	2270003010	150	diesel	201	12	21%	8	2,903	0.02	0.16	0.08	0.02	0.02	1.33E-04	5.78E-03	43.79	1.36E-03	1.12E-03	44.16
Trencher	2270002030	200	diesel	219	12	59%	8	9,328	0.02	0.19	0.06	1.21E-02	1.17E-02	3.96E-04	3.92E-03	140.72	1.09E-03	3.58E-03	141.82
Excavators / Backhoes	2270002036	150	diesel	208	12	59%	8	6,998	2.72E-03	0.06	0.02	3.78E-03	3.66E-03	2.81E-04	6.56E-04	105.57	2.21E-04	2.69E-03	106.38
Winch Truck	2270002051	250	diesel	211	12	59%	12	17,494	5.02E-03	0.06	1.16E-02	2.34E-03	2.27E-03	6.96E-04	1.21E-03	263.93	2.11E-04	6.72E-03	265.94
Water Truck	-	-	diesel	404	-	-	4	406	1.52E-03	8.61E-03	5.49E-03	1.75E-04	1.61E-04	1.53E-05	-	4.57	6.74E-04	2.69E-05	4.60
Transportation Trucks - materials	-	-	diesel	401	-	-	32	5,324	6.76E-03	0.15	0.07	2.65E-03	2.43E-03	2.01E-04	-	59.91	7.39E-04	6.91E-05	59.95
Substation																			
Backhoe or Excavator	2270002036	150	diesel	208	12	59%	8	6,998	2.72E-03	0.06	0.02	3.78E-03	3.66E-03	2.81E-04	6.56E-04	105.57	2.21E-04	2.69E-03	106.38
Bulldozer	2270002069	200	diesel	207	12	59%	8	9,330	4.50E-03	0.05	0.02	3.58E-03	3.48E-03	3.76E-04	1.09E-03	140.76	2.83E-04	3.58E-03	141.83
Concrete Trucks	2270002042	150	diesel	204	12	43%	16	10,067	0.12	1.42	0.37	0.08	0.07	5.58E-04	0.03	151.88	6.67E-03	3.87E-03	153.20
Drill Rig	2270002033	100	diesel	203	12	43%	8	3,356	0.04	0.45	0.12	0.03	0.03	1.85E-04	9.55E-03	50.63	2.27E-03	1.29E-03	51.07
Man Lift Bucket	2270003010	150	diesel	201	12	21%	8	2,903	0.02	0.16	0.08	0.02	0.02	1.33E-04	5.78E-03	43.79	1.36E-03	1.12E-03	44.16
Trencher	2270002030	200	diesel	219	12	59%	8	9,328	0.02	0.19	0.06	1.21E-02	1.17E-02	3.96E-04	3.92E-03	140.72	1.09E-03	3.58E-03	141.82
Winch Truck	2270002051	250	diesel	211	12	59%	4	5,831	1.67E-03	0.02	3.87E-03	7.79E-04	7.56E-04	2.32E-04	4.02E-04	87.98	7.03E-05	2.24E-03	88.65
Cranes	2270002045	200	diesel	206	12	43%	8	6,726	6.08E-03	0.07	0.02	3.38E-03	3.28E-03	2.76E-04	1.46E-03	101.47	4.18E-04	2.58E-03	102.25
Forklifts	2270003020	75	diesel	209	12	59%	8	3,886	7.93E-04	0.08	6.01E-03	1.08E-03	1.05E-03	1.55E-04	1.92E-04	58.62	5.81E-05	1.49E-03	59.07
Skid Steer Loaders	2270002072	150	diesel	216	12	21%	4	1,447	0.04	0.19	0.12	0.02	0.02	8.02E-05	8.79E-03	21.82	1.89E-03	5.56E-04	22.04
Dump Truck (Side or belly dump)	-	-	diesel	402	-	-	16	2,806	5.35E-03	0.10	0.04	2.41E-03	2.21E-03	1.06E-04	-	31.59	7.00E-04	6.95E-05	31.62
Solar Panel Installation																			
Tracked Skidsteer	2270002072	175	diesel	216	12	21%	25	10,548	0.27	1.39	0.85	0.16	0.16	5.85E-04	0.06	159.14	1.38E-02	4.05E-03	160.69
Loader	2270002060	150	diesel	215	12	59%	5	4,373	3.70E-03	0.05	0.02	4.29E-03	4.16E-03	1.79E-04	8.91E-04	65.98	2.92E-04	1.68E-03	66.48
Telehandler	2270003010	150	diesel	201	12	21%	15	5,442	0.05	0.29	0.15	0.03	0.03	2.50E-04	1.08E-02	82.11	2.55E-03	2.09E-03	82.79
Project Cleanup																			
Telehandler	2270003010	150	diesel	201	12	21%	10	3,628	0.03	0.20	0.10	0.02	0.02	1.67E-04	7.22E-03	54.74	1.70E-03	1.39E-03	55.19
Tracked Skidsteer	2270002072	150	diesel	216	12	21%	20	7,233	0.18	0.96	0.58	0.11	0.11	4.01E-04	0.04	109.12	9.46E-03	2.78E-03	110.19
Transportation Trucks - material/waste	-	-	diesel	401	-	-	9	1,497	1.90E-03	0.04	0.02	7.44E-04	6.85E-04	5.65E-05	-	16.85	2.08E-04	1.94E-05	16.86
Daily Construction Traffic																			
Full size pickups, FedEx, UPS, andother delivery trucks, etc. daily	-	-	diesel	405	-	-	825	49,991	0.24	1.52	1.65	0.06	0.05	1.90E-03	-	562.62	0.04	2.87E-03	564.56
Buggies	-	-	gasoline	406	-	-	352	11,561	0.11	0.06	1.62	2.79E-03	2.47E-03	8.64E-04	-	130.11	9.33E-03	2.00E-03	130.94
Busses	-	-	diesel	403	-	-	66	6,175	8.76E-03	0.12	0.08	2.85E-03	2.62E-03	2.33E-04	-	69.50	1.54E-03	2.39E-04	69.61
							Total	**324,457**	**1.92**	**13.23**	**8.75**	**1.05**	**1.01**	**1.43E-02**	**0.36**	**4,547.13**	**0.15**	**0.10**	**4,579.36**

Notes:

1. Equipment assumptions based on information provided by the project.
2. Calculations assume equipment is used 5 days/wk - i.e. days/month.
3. Calculations conservatively assume that on-road vehicles travel approximately miles per day, since emission factors from the MOVES2014 model for on-road vehicles are based on miles traveled.
4. Calculations conservatively assume workers average daily round trip commute is approximately miles per day, since emission factors from the MOVES2014 model for on-road vehicles are based on miles traveled.
5. Nonroad emission factors for criteria pollutants and GHG were estimated using EPA's MOVES2014b emission model for an assumed construction year of 2024.
6. Nonroad emission factors for HAPs were estimated using ERG, "Documentation for Aircraft, Commercial Marine Vessel, Locomotive, and Other Nonroad Components of the National Emissions Inventory," Volume I - Methodology, October
7. On-road vehicle emission factors (lb/VMT) for VOC, NOx, CO, PM10, SO2, and CO2e, were estimated using the MOVES2014b emission model for an assumed construction year of 2024.
8. On-road vehicle emission factors for HAP were not provided with the default MOVES input files for Benton County, but are presumed to be de minimis.

Adapted from Tables 2.15-2 through 2.15-4 of EFSEC ASC

Horse Heaven Wind Farm - Construction Emissions Phase 2a Battery (150 MW)

								Fuel Use	Emissions										
Construction Equipment	**Source Category**	**HP per unit**	**Fuel Type**	**Emiss. Factor ID**	**hrs per day**	**Load Factor**	**Total Equip. Months**	**gal**	**VOC tons**	**NO_X tons**	**CO tons**	**PM_{10} tons**	**$PM_{2.5}$ tons**	**SO_2 tons**	**HAP Tons**	**CO_2 tons**	**CH_4 tons**	**N_2O tons**	**CO_2e tons**
Site Prep & Road Const																			
Bulldozer	2270002069	200	diesel	207	12	59%	4	4,665	2.25E-03	0.03	8.73E-03	1.79E-03	1.74E-03	1.88E-04	5.43E-04	70.38	1.42E-04	1.79E-03	70.92
Excavator / Backhoe	2270002036	150	diesel	208	12	59%	4	3,499	1.36E-03	0.03	8.70E-03	1.89E-03	1.83E-03	1.40E-04	3.28E-04	52.78	1.10E-04	1.34E-03	53.19
Loader / Skid Steer loader	2270002072	150	diesel	216	12	21%	2	723	0.02	0.10	0.06	1.10E-02	1.07E-02	4.01E-05	4.40E-03	10.91	9.46E-04	2.78E-04	11.02
Motor grader	2270002048	100	diesel	210	12	59%	2	1,166	6.37E-04	1.12E-02	4.19E-03	9.88E-04	9.59E-04	4.73E-05	1.54E-04	17.59	5.27E-05	4.48E-04	17.73
Vibratory Roller	2270002015	75	diesel	214	12	59%	2	971	8.52E-04	0.03	8.55E-03	1.12E-03	1.09E-03	3.97E-05	2.05E-04	14.65	6.60E-05	3.73E-04	14.77
Dump / Belly Truck	-	-	diesel	402	-	-	4	702	1.34E-03	0.02	1.07E-02	6.02E-04	5.54E-04	2.66E-05	-	7.90	1.75E-04	1.74E-05	7.91
Water Truck	-	-	diesel	404	-	-	2	203	7.58E-04	4.30E-03	2.74E-03	8.77E-05	8.06E-05	7.66E-06	-	2.29	3.37E-04	1.35E-05	2.30
Fuel Truck	-	-	diesel	404	-	-	2	203	7.58E-04	4.30E-03	2.74E-03	8.77E-05	8.06E-05	7.66E-06	-	2.29	3.37E-04	1.35E-05	2.30
Foundation																			
Rough Terrain Cranes	2270002045	200	diesel	206	12	43%	2	1,682	1.52E-03	0.02	4.29E-03	8.45E-04	8.19E-04	6.91E-05	3.65E-04	25.37	1.05E-04	6.46E-04	25.56
Concrete Truck	2270002042	150	diesel	204	12	43%	8	5,034	0.06	0.71	0.18	0.04	0.04	2.79E-04	1.49E-02	75.94	3.33E-03	1.93E-03	76.60
Backhoe or Excavator	2270002036	150	diesel	208	12	59%	4	3,499	1.36E-03	0.03	8.70E-03	1.89E-03	1.83E-03	1.40E-04	3.28E-04	52.78	1.10E-04	1.34E-03	53.19
Forklifts	2270003020	75	diesel	209	12	59%	4	1,943	3.97E-04	0.04	3.01E-03	5.41E-04	5.25E-04	7.73E-05	9.59E-05	29.31	2.91E-05	7.46E-04	29.53
Skid Steer loader	2270002072	150	diesel	216	12	21%	2	723	0.02	0.10	0.06	1.10E-02	1.07E-02	4.01E-05	4.40E-03	10.91	9.46E-04	2.78E-04	11.02
Dump Truck	-	-	diesel	402	-	-	4	702	1.34E-03	0.02	1.07E-02	6.02E-04	5.54E-04	2.66E-05	-	7.90	1.75E-04	1.74E-05	7.91
Transportation Trucks - materials	-	-	diesel	401	-	-	4	665	8.45E-04	0.02	9.26E-03	3.31E-04	3.04E-04	2.51E-05	-	7.49	9.24E-05	8.63E-06	7.49
Water Truck	-	-	diesel	404	-	-	2	203	7.58E-04	4.30E-03	2.74E-03	8.77E-05	8.06E-05	7.66E-06	-	2.29	3.37E-04	1.35E-05	2.30
Fuel Truck	-	-	diesel	404	-	-	2	203	7.58E-04	4.30E-03	2.74E-03	8.77E-05	8.06E-05	7.66E-06	-	2.29	3.37E-04	1.35E-05	2.30
Electrical																			
Boom Truck	2270003010	150	diesel	201	12	21%	2	726	6.00E-03	0.04	0.02	4.07E-03	3.95E-03	3.34E-05	1.44E-03	10.95	3.40E-04	2.79E-04	11.04
Fork Truck for Spool Offload	2270003020	75	diesel	209	12	59%	2	971	1.98E-04	0.02	1.50E-03	2.70E-04	2.62E-04	3.86E-05	4.79E-05	14.66	1.45E-05	3.73E-04	14.77
Man Lift Bucket	2270003010	150	diesel	201	12	21%	2	726	6.00E-03	0.04	0.02	4.07E-03	3.95E-03	3.34E-05	1.44E-03	10.95	3.40E-04	2.79E-04	11.04
Trencher	2270002030	200	diesel	219	12	59%	2	2,332	4.07E-03	0.05	0.02	3.03E-03	2.94E-03	9.89E-05	9.81E-04	35.18	2.73E-04	8.96E-04	35.45
Excavators / Backhoes	2270002036	150	diesel	208	12	59%	2	1,749	6.79E-04	1.45E-02	4.35E-03	9.44E-04	9.16E-04	7.02E-05	1.64E-04	26.39	5.52E-05	6.72E-04	26.59
Transportation Trucks - materials	-	-	diesel	401	-	-	4	665	8.45E-04	0.02	9.26E-03	3.31E-04	3.04E-04	2.51E-05	-	7.49	9.24E-05	8.63E-06	7.49
Project Cleanup																			
Front end loader	2270002060	150	diesel	215	12	59%	1	875	7.39E-04	9.78E-03	3.89E-03	8.58E-04	8.33E-04	3.58E-05	1.78E-04	13.20	5.85E-05	3.36E-04	13.30
Motor grader	2270002048	100	diesel	210	12	59%	1	583	3.19E-04	5.58E-03	2.09E-03	4.94E-04	4.79E-04	2.36E-05	7.70E-05	8.80	2.64E-05	2.24E-04	8.86
Dump Truck	-	-	diesel	402	-	-	1	175	3.34E-04	6.09E-03	2.67E-03	1.50E-04	1.38E-04	6.66E-06	-	1.97	4.37E-05	4.35E-06	1.98
Transportation Trucks - material/waste	-	-	diesel	401	-	-	1	166	2.11E-04	4.72E-03	2.32E-03	8.27E-05	7.61E-05	6.27E-06	-	1.87	2.31E-05	2.16E-06	1.87
Daily Construction Traffic																			
Full size pickups, FedEx, UPS, and otherdelivery trucks, etc. daily	-	-	diesel	405	-	-	400	24,238	0.12	0.74	0.80	0.03	0.02	9.23E-04	-	272.79	0.02	1.39E-03	273.73
							Total	**59,993**	**0.25**	**2.12**	**1.27**	**0.11**	**0.11**	**2.47E-03**	**0.03**	**797.29**	**0.03**	**1.37E-02**	**802.14**

Notes:
1. Equipment assumptions based on information provided by the project.
2. Calculations assume equipment is used 5 days/wk - i.e., days/month.
3. Calculations conservatively assume that on-road vehicles travel approximately miles per day, since emission factors from the MOVES2014 model for on-road vehicles are based on miles traveled.
4. Calculations conservatively assume workers average daily round trip commute is approximately miles per day, since emission factors from the MOVES2014 model for on-road vehicles are based on miles traveled.
5. Nonroad emission factors for criteria pollutants and GHG were estimated using EPA's MOVES2014b emission model for an assumed construction year of 2024.
6. Nonroad emission factors for HAPs were estimated using ERG, "Documentation for Aircraft, Commercial Marine Vessel, Locomotive, and Other Nonroad Components of the National Emissions Inventory," Volume I - Methodology, October 7,
7. On-road vehicle emission factors (lb/VMT) for VOC, NOx, CO, PM10, SO2, and CO2e, were estimated using the MOVES2014b emission model for an assumed construction year of 2024.
8. On-road vehicle emission factors for HAP were not provided with the default MOVES input files for Benton County, but are presumed to be de minimis.

Adapted from Tables 2.15-2 through 2.15-4 of EFSEC ASC

Horse Heaven Wind Farm - Construction Emissions Phase 2b Wind (500 MW)

Construction Equipment	Source Category	HP per unit	Fuel Type	Emiss. Factor ID	hrs per day	Load Factor	Total Equip. Months	Fuel Use gal	Emissions VOC tons	NO_x tons	CO tons	PM_{10} tons	$PM_{2.5}$ tons	SO_2 tons	HAP Tons	CO_2 tons	CH_4 tons	N_2O tons	CO_2e tons
Site Prep & Road Const																			
Bulldozer	2270002069	200	diesel	207	12	59%	32	37,320	0.02	0.22	0.07	1.43E-02	1.39E-02	1.50E-03	4.34E-03	563.02	1.13E-03	1.43E-02	567.33
Excavator / Backhoe	2270002036	150	diesel	208	12	59%	32	27,991	1.09E-02	0.23	0.07	0.02	1.47E-02	1.12E-03	2.62E-03	422.28	8.82E-04	1.08E-02	425.50
Loader / Skid Steer loader	2270002072	150	diesel	216	12	21%	32	11,573	0.29	1.53	0.94	0.18	0.17	6.42E-04	0.07	174.59	0.02	4.45E-03	176.30
Motor grader	2270002048	100	diesel	210	12	59%	32	18,660	1.02E-02	0.18	0.07	0.02	0.02	7.57E-04	2.46E-03	281.51	8.44E-04	7.17E-03	283.67
Vibratory Roller	2270002015	75	diesel	214	12	59%	24	11,655	1.02E-02	0.33	0.10	1.34E-02	1.30E-02	4.77E-04	2.47E-03	175.84	7.92E-04	4.48E-03	177.19
Dump / Belly Truck	-	-	diesel	402	-	-	96	16,839	0.03	0.59	0.26	1.44E-02	1.33E-02	6.39E-04	-	189.51	4.20E-03	4.17E-04	189.74
Water Truck	-	-	diesel	404	-	-	64	6,497	0.02	0.14	0.09	2.81E-03	2.58E-03	2.45E-04	-	73.12	1.08E-02	4.31E-04	73.52
Fuel Truck	-	-	diesel	404	-	-	16	1,624	6.06E-03	0.03	0.02	7.01E-04	6.45E-04	6.12E-05	-	18.28	2.70E-03	1.08E-04	18.38
Foundation																			
Rough Terrain Cranes	2270002045	200	diesel	206	12	43%	18	15,134	1.37E-02	0.16	0.04	7.60E-03	7.37E-03	6.22E-04	3.29E-03	228.31	9.41E-04	5.81E-03	230.07
Concrete pump truck	2270002042	200	diesel	205	12	43%	12	10,070	0.11	1.33	0.33	0.06	0.06	5.59E-04	0.03	151.92	5.67E-03	3.87E-03	153.22
Concrete Truck	2270002042	150	diesel	204	12	43%	96	60,404	0.74	8.53	2.20	0.45	0.44	3.35E-03	0.18	911.27	0.04	0.02	919.19
Backhoe or Excavator	2270002036	150	diesel	208	12	59%	24	20,993	8.15E-03	0.17	0.05	1.13E-02	1.10E-02	8.43E-04	1.97E-03	316.71	6.62E-04	8.07E-03	319.13
Forklifts	2270003020	75	diesel	209	12	59%	18	8,743	1.78E-03	0.19	1.35E-02	2.43E-03	2.36E-03	3.48E-04	4.31E-04	131.90	1.31E-04	3.36E-03	132.90
Skid Steer loader	2270002072	150	diesel	216	12	21%	12	4,340	0.11	0.57	0.35	0.07	0.06	2.41E-04	0.03	65.47	5.68E-03	1.67E-03	66.11
Dump Truck	-	-	diesel	402	-	-	36	6,315	1.20E-02	0.22	0.10	5.42E-03	4.98E-03	2.40E-04	-	71.07	1.57E-03	1.56E-04	71.15
Transportation Trucks - materials	-	-	diesel	401	-	-	36	5,989	7.60E-03	0.17	0.08	2.98E-03	2.74E-03	2.26E-04	-	67.40	8.32E-04	7.77E-05	67.45
Water Truck	-	-	diesel	404	-	-	24	2,436	9.09E-03	0.05	0.03	1.05E-03	9.68E-04	9.19E-05	-	27.42	4.05E-03	1.62E-04	27.57
Fuel Truck	-	-	diesel	404	-	-	12	1,218	4.55E-03	0.03	0.02	5.26E-04	4.84E-04	4.59E-05	-	13.71	2.02E-03	8.08E-05	13.79
Electrical																			
Boom Truck	2270003010	150	diesel	201	12	21%	16	5,805	0.05	0.31	0.16	0.03	0.03	2.67E-04	1.16E-02	87.58	2.72E-03	2.23E-03	88.31
Fork Truck for Spool Offload	2270003020	75	diesel	209	12	59%	16	7,771	1.59E-03	0.17	1.20E-02	2.16E-03	2.10E-03	3.09E-04	3.83E-04	117.24	1.16E-04	2.99E-03	118.13
Man Lift Bucket	2270003010	150	diesel	201	12	21%	16	5,805	0.05	0.31	0.16	0.03	0.03	2.67E-04	1.16E-02	87.58	2.72E-03	2.23E-03	88.31
Trencher	2270002030	200	diesel	219	12	59%	16	18,656	0.03	0.38	0.12	0.02	0.02	7.91E-04	7.84E-03	281.45	2.19E-03	7.17E-03	283.64
Excavators / Backhoes	2270002036	150	diesel	208	12	59%	16	13,995	5.43E-03	0.12	0.03	7.55E-03	7.33E-03	5.62E-04	1.31E-03	211.14	4.41E-04	5.38E-03	212.75
Winch Truck	2270002051	250	diesel	211	12	59%	24	34,989	1.00E-02	0.12	0.02	4.67E-03	4.53E-03	1.39E-03	2.41E-03	527.85	4.22E-04	1.34E-02	531.87
Transportation Trucks - materials	-	-	diesel	401	-	-	64	10,647	1.35E-02	0.30	0.15	5.29E-03	4.87E-03	4.02E-04	-	119.83	1.48E-03	1.38E-04	119.91
Substation																			
Backhoe or Excavator	2270002036	150	diesel	208	12	59%	20	17,494	6.79E-03	0.14	0.04	9.44E-03	9.16E-03	7.02E-04	1.64E-03	263.92	5.52E-04	6.72E-03	265.94
Bulldozer	2270002069	200	diesel	207	12	59%	20	23,325	1.13E-02	0.13	0.04	8.96E-03	8.69E-03	9.40E-04	2.71E-03	351.89	7.09E-04	8.96E-03	354.58
Concrete Trucks	2270002042	150	diesel	204	12	43%	40	25,168	0.31	3.56	0.92	0.19	0.18	1.40E-03	0.07	379.70	0.02	9.67E-03	382.99
Drill Rig	2270002033	100	diesel	203	12	43%	20	8,390	0.10	1.14	0.29	0.07	0.06	4.63E-04	0.02	126.58	5.67E-03	3.22E-03	127.68
Man Lift Bucket	2270003010	150	diesel	201	12	21%	20	7,256	0.06	0.39	0.20	0.04	0.04	3.34E-04	1.44E-02	109.47	3.40E-03	2.79E-03	110.39
Trencher	2270002030	200	diesel	219	12	59%	20	23,320	0.04	0.48	0.15	0.03	0.03	9.89E-04	9.81E-03	351.81	2.73E-03	8.96E-03	354.55
Winch Truck	2270002051	250	diesel	211	12	59%	10	14,579	4.18E-03	0.05	9.67E-03	1.95E-03	1.89E-03	5.80E-04	1.01E-03	219.94	1.76E-04	5.60E-03	221.61
Cranes	2270002045	200	diesel	206	12	43%	20	16,815	0.02	0.18	0.04	8.45E-03	8.19E-03	6.91E-04	3.65E-03	253.68	1.05E-03	6.46E-03	255.63
Forklifts	2270003020	75	diesel	209	12	59%	20	9,714	1.98E-03	0.21	0.02	2.70E-03	2.62E-03	3.86E-04	4.79E-04	146.55	1.45E-04	3.73E-03	147.67
Skid Steer Loaders	2270002072	150	diesel	216	12	21%	10	3,617	0.09	0.48	0.29	0.06	0.05	2.01E-04	0.02	54.56	4.73E-03	1.39E-03	55.09
Dump Truck (Side or belly dump)	-	-	diesel	402	-	-	40	7,016	1.34E-02	0.24	0.11	6.02E-03	5.54E-03	2.66E-04	-	78.96	1.75E-03	1.74E-04	79.06
Wind Turbine Assembly & Erection																			
Man Lift Bucket	2270003010	150	diesel	201	12	21%	56	20,318	0.17	1.10	0.57	0.11	0.11	9.34E-04	0.04	306.53	9.53E-03	7.81E-03	309.09
Forklift	2270003020	75	diesel	209	12	59%	28	13,600	2.78E-03	0.30	0.02	3.79E-03	3.67E-03	5.41E-04	6.71E-04	205.17	2.04E-04	5.22E-03	206.73
Rough Terrain Cranes	2270002045	200	diesel	206	12	43%	70	58,853	0.05	0.64	0.15	0.03	0.03	2.42E-03	1.28E-02	887.87	3.66E-03	0.02	894.70
Track mounted cranes	2270002045	200	diesel	206	12	43%	18	15,134	1.37E-02	0.16	0.04	7.60E-03	7.37E-03	6.22E-04	3.29E-03	228.31	9.41E-04	5.81E-03	230.07
Transportation Trucks - materials &	-	-	diesel	401	-	-	336	55,898	7.10E-02	1.59	0.78	0.03	0.03	2.11E-03	-	629.10	7.76E-03	7.25E-04	629.51
Transmission Line																			
Cranes	2270002045	200	diesel	206	8	43%	8	4,484	4.05E-03	0.05	1.14E-02	2.25E-03	2.18E-03	1.84E-04	9.74E-04	67.65	2.79E-04	1.72E-03	68.17
Bucket Trucks	2270003010	150	diesel	201	8	21%	20	4,838	0.04	0.26	0.14	0.03	0.03	2.22E-04	9.63E-03	72.98	2.27E-03	1.86E-03	73.59
Wire Pullers	2270002081	100	diesel	213	6	59%	6	1,749	3.26E-03	0.04	1.35E-02	2.86E-03	2.78E-03	7.38E-05	7.86E-04	26.38	2.38E-04	6.72E-04	26.59
Wire Tensioners	2270002081	100	diesel	213	6	59%	6	1,749	3.26E-03	0.04	1.35E-02	2.86E-03	2.78E-03	7.38E-05	7.86E-04	26.38	2.38E-04	6.72E-04	26.59
Excavators or Backhoes	2270002036	150	diesel	208	4	59%	18	5,248	2.04E-03	0.04	1.31E-02	2.83E-03	2.75E-03	2.11E-04	4.92E-04	79.18	1.65E-04	2.02E-03	79.78
Forklifts	2270003020	75	diesel	209	4	59%	12	1,943	3.97E-04	0.04	3.01E-03	5.41E-04	5.25E-04	7.73E-05	9.59E-05	29.31	2.91E-05	7.46E-04	29.53
Truck / track diggers	2270002036	150	diesel	208	6	59%	4	1,749	6.79E-04	1.45E-02	4.35E-03	9.44E-04	9.16E-04	7.02E-05	1.64E-04	26.39	5.52E-05	6.72E-04	26.59

Adapted from Tables 2.15-2 through 2.15-4 of EFSEC ASC

Horse Heaven Wind Farm - Construction Emissions Phase 2b Wind (500 MW)

Construction Equipment	Source Category	HP per unit	Fuel Type	Emiss. Factor ID	hrs per day	Load Factor	Total Equip. Months	Fuel Use gal	Emissions VOC tons	NO_X tons	CO tons	PM_{10} tons	$PM_{2.5}$ tons	SO_2 tons	HAP Tons	CO_2 tons	CH_4 tons	N_2O tons	CO_2e tons
Dozers	2270002069	200	diesel	207	4	59%	5	1,944	9.39E-04	1.12E-02	3.64E-03	7.47E-04	7.24E-04	7.83E-05	2.26E-04	29.32	5.91E-05	7.47E-04	29.55
UTVs	2270001060	75	diesel	217	2	21%	6	201	2.68E-03	0.02	1.32E-02	1.79E-03	1.74E-03	9.71E-06	6.44E-04	3.04	1.07E-04	7.73E-05	3.06
Tractor	2270002066	150	diesel	218	6	21%	4	725	1.13E-02	0.06	0.04	7.33E-03	7.11E-03	3.68E-05	2.72E-03	10.93	7.19E-04	2.78E-04	11.03
Skid Steer Loaders	2270002072	150	diesel	216	6	21%	12	2,170	0.05	0.29	0.18	0.03	0.03	1.20E-04	1.32E-02	32.74	2.84E-03	8.34E-04	33.06
Underground boring equipment	2270002033	100	diesel	203	8	43%	12	3,356	0.04	0.45	0.12	0.03	0.03	1.85E-04	9.55E-03	50.63	2.27E-03	1.29E-03	51.07
Tractor Trailers	-	-	diesel	401	-	-	6	998	1.27E-03	0.03	1.39E-02	4.96E-04	4.56E-04	3.76E-05	-	11.23	1.39E-04	1.30E-05	11.24
Fuel Trucks / Trailers	-	-	diesel	404	-	-	6	609	2.27E-03	1.29E-02	8.23E-03	2.63E-04	2.42E-04	2.30E-05	-	6.86	1.01E-03	4.04E-05	6.89
O&M Building																			
Excavators or Backhoes	2270002036	150	diesel	208	10	59%	12	8,747	3.39E-03	0.07	0.02	4.72E-03	4.58E-03	3.51E-04	8.20E-04	131.96	2.76E-04	3.36E-03	132.97
Forklifts	2270003020	75	diesel	209	10	59%	8	3,238	6.61E-04	0.07	5.01E-03	9.01E-04	8.74E-04	1.29E-04	1.60E-04	48.85	4.85E-05	1.24E-03	49.22
Skid Steer Loaders	2270002072	150	diesel	216	10	21%	16	4,822	0.12	0.64	0.39	0.07	0.07	2.67E-04	0.03	72.75	6.31E-03	1.85E-03	73.46
Air compressor	2270006015	50	diesel	202	10	43%	4	779	2.14E-03	0.06	1.04E-02	1.32E-03	1.28E-03	3.34E-05	5.14E-04	11.75	2.47E-04	2.99E-04	11.84
Project Cleanup																			
Front end loader	2270002060	150	diesel	215	12	59%	10	8,746	7.39E-03	0.10	0.04	8.58E-03	8.33E-03	3.58E-04	1.78E-03	131.95	5.85E-04	3.36E-03	132.97
Motor grader	2270002048	100	diesel	210	12	59%	10	5,831	3.19E-03	0.06	0.02	4.94E-03	4.79E-03	2.36E-04	7.70E-04	87.97	2.64E-04	2.24E-03	88.65
Dump Truck	-	-	diesel	402	-	-	10	1,754	3.34E-03	0.06	0.03	1.50E-03	1.38E-03	6.66E-05	-	19.74	4.37E-04	4.35E-05	19.76
Transportation Trucks - material/waste	-	-	diesel	401	-	-	15	2,495	3.17E-03	0.07	0.03	1.24E-03	1.14E-03	9.41E-05	-	28.08	3.47E-04	3.24E-05	28.10
Daily Construction Traffic																			
Full size pickups, FedEx, UPS, and other delivery trucks, etc. da	-	-	diesel	405	-	-	2,100	127,250	0.61	3.87	4.19	0.14	0.13	4.84E-03	-	1432.12	0.11	7.32E-03	1437.07
Worker Commute																			
Light Commercial Truck	-	-	diesel	405	-	-	1,626	98,528	0.47	2.99	3.25	0.11	0.10	3.75E-03	-	1108.87	0.09	5.66E-03	1112.71
Passenger Car	-	-	gasoline	406	-	-	1,084	35,602	0.33	0.19	4.98	8.60E-03	7.61E-03	2.66E-03	-	400.68	0.03	6.17E-03	403.24
							Total	**1,015,521**	**4.27**	**36.73**	**22.69**	**2.04**	**1.96**	**0.04**	**0.64**	**13,857.79**	**0.41**	**0.27**	**13,947.13**

Notes:
1. Equipment assumptions based on information provided by the project.
2. Calculations assume equipment is used 5 days/wk - i.e. days/month.
3. Calculations conservatively assume that on-road vehicles travel approximately miles per day, since emission factors from the MOVES2014 model for on-road vehicles are based on miles traveled.
4. Calculations conservatively assume workers average daily round trip commute is approximately miles per day, since emission factors from the MOVES2014 model for on-road vehicles are based on miles traveled.
5. Nonroad emission factors for criteria pollutants and GHG were estimated using EPA's MOVES2014b emission model for an assumed construction year of 2024.
6. Nonroad emission factors for HAPs were estimated using ERG, "Documentation for Aircraft, Commercial Marine Vessel, Locomotive, and Other Nonroad Components of the National Emissions Inventory," Volume I - Methodology, October 7, 2003.
7. On-road vehicle emission factors (lb/VMT) for VOC, NOx, CO, PM10, SO2, and CO2e, were estimated using the MOVES2014b emission model for an assumed construction year of 2024.
8. On-road vehicle emission factors for HAP were not provided with the default MOVES input files for Benton County, but are presumed to be de minimis.

Adapted from Tables 2.15-2 through 2.15-4 of EFSEC ASC

Horse Heaven Wind Farm - Construction Emissions Operations and Maintenance

Construction Equipment	Source Category	HP per unit	Fuel Type	Emiss. Factor ID	hrs per day	Load Factor	Total Equip. Months	Fuel Use gal	Emissions VOC tons	NO_X tons	CO tons	PM_{10} tons	$PM_{2.5}$ tons	SO_2 tons	HAP Tons	CO_2 tons	CH_4 tons	N_2O tons	CO_2e tons
Solar Panel Cleaning																			
Water Truck	-	-	diesel	404	-	-	24	2,436	9.09E-03	0.05	0.03	1.05E-03	9.68E-04	9.19E-05	-	27.42	4.05E-03	1.62E-04	27.57
Worker Commute																			
Light Commercial Truck	-	-	diesel	405	-	-	115	6,968	0.03	0.21	0.23	7.76E-03	7.14E-03	2.65E-04	-	78.43	6.07E-03	4.01E-04	78.70
Passenger Car	-	-	gasoline	406	-	-	77	2,529	0.02	0.01	0.35	6.11E-04	5.40E-04	1.89E-04	-	28.46	2.04E-03	4.38E-04	28.64
							Total	**11,934**	**0.07**	**0.28**	**0.62**	**9.43E-03**	**8.65E-03**	**5.46E-04**	**0.00**	**134.31**	**1.22E-02**	**1.00E-03**	**134.91**

Notes:
1. Equipment assumptions based on information provided by the project.
2. Calculations assume equipment is used 5 days/wk - i.e., days/month.
3. Calculations conservatively assume that on-road vehicles travel approximately miles per day, since emission factors from the MOVES2014 model for on-road vehicles are based on miles traveled.
4. Calculations conservatively assume workers average daily round trip commute is approximately miles per day, since emission factors from the MOVES2014 model for on-road vehicles are based on miles traveled.
5. Nonroad emission factors for criteria pollutants and GHG were estimated using EPA's MOVES2014b emission model for an assumed construction year of 2024.
6. Nonroad emission factors for HAPs were estimated using ERG, "Documentation for Aircraft, Commercial Marine Vessel, Locomotive, and Other Nonroad Components of the National Emissions Inventory," Volume I - Methodology, October 7,
7. On-road vehicle emission factors (lb/VMT) for VOC, NOx, CO, PM10, SO2, and CO2e, were estimated using the MOVES2014b emission model for an assumed construction year of 2024.
8. On-road vehicle emission factors for HAP were not provided with the default MOVES input files for Benton County, but are presumed to be de minimis.

Horse Heaven Wind Farm Emission Factors
2023 Factors for Land-based Nonroad Engines and Other Equipment (Benton County, WA)

	NONROAD Source Category SCC	Description	Engine Size (hp)	NONROAD Emission Factors (g/hp-hr) /a Exhaust+ Crankcase VOC	Exhaust NOx	Exhaust CO	Exhaust PM_{10}	Exhaust $PM_{2.5}$	Exhaust SO_2	Exhaust CO_2	Exhaust CH_4	Climate Leaders (g/kWh) /b Exhaust N_2O	Fuel Consumption gal/kWh/c	NONROAD Default Load Factor
101	2270003010	Aerial Lifts	100 < hp <= 175	0.376424	2.443597	1.276235	0.254440	0.246807	0.001927	625.5	0.020662	0.016	0.061	21%
102	2270006015	Air Compressors	50 < hp <= 75	0.119871	2.895070	0.596171	0.078496	0.076141	0.001705	590.0	0.013032	0.015	0.058	43%
103	2270002033	Bore/Drill Rigs	100 < hp <= 175	0.427554	4.897321	1.265764	0.283498	0.274993	0.001948	529.8	0.023823	0.013	0.052	43%
104	2270002042	Cement & Mortar Mixers	100 < hp <= 175	0.436188	5.030485	1.299992	0.266438	0.258445	0.001948	529.8	0.022694	0.013	0.052	43%
105	2270002042	Cement & Mortar Mixers	175 < hp <= 300	0.385082	4.731720	1.157440	0.216126	0.209642	0.001949	529.9	0.019336	0.013	0.052	43%
106	2270002045	Cranes	175 < hp <= 300	0.041190	0.501905	0.115081	0.022971	0.022281	0.001463	530.9	0.002864	0.014	0.052	43%
107	2270002069	Crawler Tractor/Dozers	175 < hp <= 300	0.021693	0.261679	0.093740	0.019313	0.018733	0.001446	536.8	0.001491	0.014	0.053	59%
108	2270002036	Excavators	100 < hp <= 175	0.017780	0.362621	0.116397	0.026855	0.026049	0.001439	536.8	0.001495	0.014	0.053	59%
109	2270003020	Forklifts	75 < hp <= 100	0.009126	0.877277	0.080988	0.014059	0.013638	0.001574	596.1	0.000691	0.015	0.058	59%
110	2270002048	Graders	100 < hp <= 175	0.027585	0.453197	0.184198	0.045672	0.044302	0.001464	536.8	0.002341	0.014	0.053	59%
111	2270002051	Off-highway Trucks	175 < hp <= 300	0.010901	0.128754	0.027887	0.005615	0.005447	0.001417	536.8	0.000494	0.014	0.053	59%
112	2270002081	Other Construction Equipment	50 < hp <= 75	0.139477	2.984215	0.921432	0.109816	0.106521	0.001689	595.8	0.012876	0.015	0.058	59%
113	2270002081	Other Construction Equipment	100 < hp <= 175	0.079433	0.920534	0.324906	0.069897	0.067800	0.001522	536.6	0.005693	0.014	0.053	59%
114	2270002015	Rollers	75 < hp <= 100	0.047096	1.233691	0.449010	0.057364	0.055643	0.001633	596.0	0.003470	0.015	0.058	59%
115	2270002060	Rubber Tire Loaders	100 < hp <= 175	0.039552	0.494267	0.194670	0.042373	0.041102	0.001470	536.7	0.003130	0.014	0.053	59%
116	2270002072	Skid Steer Loaders	100 < hp <= 175	1.058915	5.532446	3.396834	0.638169	0.619024	0.002293	623.5	0.052753	0.016	0.061	21%
117	2270001060	Specialty Vehicle Carts	50 < hp <= 75	0.669291	4.141205	3.279180	0.450044	0.436543	0.002247	694.1	0.025095	0.018	0.068	21%
118	2270002066	Tractors/Loaders/Backhoes	100 < hp <= 175	0.746563	4.152040	2.356593	0.476468	0.462175	0.002172	624.4	0.047102	0.016	0.061	21%
119	2270002030	Trenchers	175 < hp <= 300	0.074220	0.875665	0.280526	0.056045	0.054363	0.001530	536.6	0.004972	0.014	0.053	59%

/a Emission factors for the land-based nonroad engines were estimated using EPA's MOVES2014b emission model for an assumed construction year of 2023.
/b Emission factors for N_2O are based on Table B-8 of the EPA report, "Direct Emissions from Mobile Combustion Sources, U.S. EPA Center for Corporate Leadership – Greenhouse Gas Inventory Guidance," EPA430-K-16-004, January 2016. (0.26 g N2O/gal fuel)
/c Fuel consumption for each type of equipment was estimated based on CO2 emission factor (g/hp-hr) generated from the MOVES2014b model and the emission factor for the mass of CO2 generated per gallon of fuel (10.21 kg CO_2/gal fuel) as presented in Table A-1 of the EPA report, "Direct Emissions from Mobile Combustion Sources, U.S. EPA Center for Corporate Leadership – Greenhouse Gas Inventory Guidance," EPA430-K-16-004, January 2016.

Adapted from Tables 2.15-2 through 2.15-4 of EFSEC ASC

Horse Heaven Wind Farm
2024 Factors for Land-based Nonroad Engines and Other Equipment (Benton County, WA)

	NONROAD Source Category				NONROAD Emission Factors (g/hp-hr) /a								
	SCC	**Description**	**Engine Size (hp)**	**Exhaust+ Crankcase VOC**	**Exhaust NO_x**	**Exhaust CO**	**Exhaust PM_{10}**	**Exhaust $PM_{2.5}$**	**Exhaust SO_2**	**Exhaust CO_2**	**Exhaust CH_4**	**Climate Leaders (g/kWh) /b Exhaust N_2O**	**Fuel Consumption gal/kWh /c**	**NONROAD Default Load Factor**
201	2270003010	Aerial Lifts	100 < hp <= 175	0.343116	2.244312	1.168366	0.232684	0.225704	0.001907	625.6	0.019457	0.016	0.061	21%
202	2270006015	Air Compressors	50 < hp <= 75	0.107269	2.833988	0.524802	0.066519	0.064523	0.001676	590.1	0.012384	0.015	0.058	43%
203	2270002033	Bore/Drill Rigs	100 < hp <= 175	0.415637	4.758356	1.220811	0.276390	0.268098	0.001938	529.9	0.023742	0.013	0.052	43%
204	2270002042	Cement & Mortar Mixers	100 < hp <= 175	0.431877	4.960604	1.278622	0.262782	0.254898	0.001948	529.8	0.023260	0.013	0.052	43%
205	2270002042	Cement & Mortar Mixers	175 < hp <= 300	0.380258	4.656690	1.136865	0.211408	0.205065	0.001949	530.0	0.019791	0.013	0.052	43%
206	2270002045	Cranes	175 < hp <= 300	0.031792	0.383332	0.089851	0.017676	0.017146	0.001446	531.0	0.002188	0.014	0.052	43%
207	2270002069	Crawler Tractor/Dozers	175 < hp <= 300	0.017180	0.205727	0.066568	0.013666	0.013256	0.001434	536.8	0.001081	0.014	0.053	59%
208	2270002036	Excavators	100 < hp <= 175	0.013805	0.294341	0.088521	0.019202	0.018626	0.001428	536.8	0.001122	0.014	0.053	59%
209	2270003020	Forklifts	75 < hp <= 100	0.008068	0.863434	0.061159	0.011000	0.010670	0.001571	596.1	0.000591	0.015	0.058	59%
210	2270002048	Graders	100 < hp <= 175	0.019442	0.340177	0.127815	0.030156	0.029251	0.001443	536.8	0.001608	0.014	0.053	59%
211	2270002051	Off-highway Trucks	175 < hp <= 300	0.010204	0.120191	0.023612	0.004752	0.004610	0.001415	536.8	0.000429	0.014	0.053	59%
212	2270002081	Other Construction Equipment	50 < hp <= 75	0.122516	2.900716	0.785789	0.091306	0.088567	0.001667	595.8	0.012211	0.015	0.058	59%
213	2270002081	Other Construction Equipment	100 < hp <= 175	0.066363	0.777606	0.274295	0.058201	0.056455	0.001502	536.6	0.004835	0.014	0.053	59%
214	2270002015	Rollers	75 < hp <= 100	0.034643	1.131882	0.347647	0.045550	0.044183	0.001616	596.1	0.002685	0.015	0.058	59%
215	2270002060	Rubber Tire Loaders	100 < hp <= 175	0.030069	0.397966	0.158162	0.034918	0.033870	0.001456	536.7	0.002379	0.014	0.053	59%
216	2270002072	Skid Steer Loaders	100 < hp <= 175	1.044565	5.461095	3.340533	0.631123	0.612190	0.002293	623.6	0.054061	0.016	0.061	21%
217	2270001060	Specialty Vehicle Carts	50 < hp <= 75	0.612170	3.999074	3.017768	0.410255	0.397947	0.002220	694.2	0.024358	0.018	0.068	21%
218	2270002066	Tractors/Loaders/Backhoes	100 < hp <= 175	0.645219	3.609054	2.049890	0.418799	0.406235	0.002105	624.7	0.041111	0.016	0.061	21%
219	2270002030	Trenchers	175 < hp <= 300	0.062155	0.730293	0.232913	0.046190	0.044804	0.001509	536.7	0.004169	0.014	0.053	59%

/a Emission factors for the land-based nonroad engines were estimated using EPA's MOVES2014b emission model for an assumed construction year of 2024.
/b Emission factors for N_2O are based on Table B-8 of the EPA report, "Direct Emissions from Mobile Combustion Sources, U.S. EPA Center for Corporate Leadership – Greenhouse Gas Inventory Guidance," EPA430-K-16-004, January 2016. (0.26 g N2O/gal fuel)
/c Fuel consumption for each type of equipment was estimated based on CO2 emission factor (g/hp-hr) generated from the MOVES2014b model and the emission factor for the mass of CO2 generated per gallon of fuel (10.21 kg CO_2/gal fuel) as presented in Table A-1 of the EPA report, "Direct Emissions from Mobile Combustion Sources, U.S. EPA Center for Corporate Leadership – Greenhouse Gas Inventory Guidance," EPA430-K-16-004, January 2016.

Horse Heaven Wind Farm Emission Factors

2023 Factor for On-road Vehicles (Benton County, WA)

301	Diesel Combination Long-haul	0.19708	4.36280	2.06888	0.08199	0.07543	0.00554	1653.0	0.02078	0.00187	1654.0	6.18
302	Truck	0.32863	5.72492	2.40662	0.15755	0.14494	0.00584	1729.2	0.03852	0.00376	1731.2	5.90
303	Diesel Refuse Truck	0.12184	1.62455	1.06090	0.03698	0.03402	0.00310	926.1	0.02096	0.00313	927.6	11.02
304	Diesel Single Unit Long-haul Truck	0.34450	1.98908	1.22486	0.04459	0.04102	0.00337	1005.3	0.14599	0.00583	1010.7	10.16
305	Diesel Single Unit Short-haul Truck	0.28924	1.80128	1.98747	0.06054	0.05570	0.00206	607.4	0.04553	0.00301	608.6	16.81
306	Diesel Light Commercial Truck	0.27542	0.17850	4.10694	0.00691	0.00611	0.00217	327.2	0.02458	0.00515	329.1	31.20

/a Emission factors (lb/VMT) for VOC, NOx, CO, PM10, SO2, and CO2e, were derived using the MOVES2014 model and inputs for calendar year 2023 using the default input files for calendar year 2023 from the State of Washington Department of Ecology.

2024 Factor for On-road Vehicles (Benton County, WA)

401	Diesel Combination Long-haul	0.18245	4.08130	2.00034	0.07144	0.06572	0.00542	1617.7	0.01996	0.00187	1618.7	6.31
402	Truck	0.28885	5.26539	2.30820	0.13000	0.11960	0.00575	1705.6	0.03780	0.00376	1707.6	5.99
403	Diesel Refuse Truck	0.11464	1.55932	1.04570	0.03728	0.03430	0.00305	909.8	0.02010	0.00313	911.2	11.22
404	Diesel Single Unit Long-haul Truck	0.32730	1.85878	1.18535	0.03787	0.03484	0.00331	987.2	0.14565	0.00582	992.5	10.34
405	Diesel Single Unit Short-haul Truck	0.25216	1.59025	1.72447	0.05833	0.05367	0.00199	589.2	0.04557	0.00301	590.4	17.33
406	Diesel Light Commercial Truck	0.26095	0.14939	3.96998	0.00685	0.00606	0.00212	319.4	0.02291	0.00492	321.2	31.97

/a Emission factors (lb/VMT) for VOC, NOx, CO, PM10, SO2, and CO2e, were derived using the MOVES2014 model and inputs for calendar year 2024 using the default input files for calendar year 2024 from the State of Washington Department of Ecology.

Adapted from Tables 2.15-2 through 2.15-4 of EFSEC ASC

Horse Heaven Wind Farm MOVES Emission Factors

Benton												
Input Year	**Fuel**	**Vehicle Type**	**Emission**									
			VOC	**NOx**	**CO**	**PM10**	**PM2.5**	**SO2**	**CO2**	**CH4**	**N2O**	**CO2e**
2023	Diesel	Combination	0.19708	4.36280	2.06888	0.08199	0.07543	0.00554	1653.0	0.02078	0.00187	1654.0
		Combination	0.20423	4.06897	1.91375	0.07046	0.06483	0.00552	1650.4	0.03287	0.00291	1652.1
		Single Unit Long-haul	0.12184	1.62455	1.06090	0.03698	0.03402	0.00310	926.1	0.02096	0.00313	927.6
		Single Unit Short-haul	0.34450	1.98908	1.22486	0.04459	0.04102	0.00337	1005.3	0.14599	0.00583	1010.7
		Refuse Truck	0.32863	5.72492	2.40662	0.15755	0.14494	0.00584	1729.2	0.03852	0.00376	1731.2
		Light Commercial	0.28924	1.80128	1.98747	0.06054	0.05570	0.00206	607.4	0.04553	0.00301	608.6
		Passenger Car	0.19987	0.10901	4.07464	0.00257	0.00237	0.00114	340.9	0.00394	0.00068	341.2
	Gasoline	Combination	9.23402	7.44913	135.8309	0.07234	0.06400	0.01038	1563.0	0.33299	0.03792	1582.5
		Single Unit Long-haul	0.76947	0.38745	7.97404	0.01577	0.01395	0.00674	1014.4	0.02776	0.00928	1017.8
		Single Unit Short-haul	1.12743	0.66741	11.18899	0.03934	0.03480	0.00717	1079.0	0.06638	0.04681	1093.0
		Refuse Truck	3.28673	4.48433	39.12965	0.18280	0.16171	0.00784	1180.6	0.17743	0.07946	1208.7
		Light Commercial	0.28364	0.31128	5.17191	0.01102	0.00975	0.00298	448.9	0.03101	0.00922	452.2
		Passenger Car	0.27542	0.17850	4.10694	0.00691	0.00611	0.00217	327.2	0.02458	0.00515	329.1

Note: Emission factors (lb/VMT) for VOC, NOx, CO, PM10, SO2, and CO2e, were derived using the MOVES2014 model and inputs for calendar year 2023 using the de input files for Benton County from the State of Washington Department of Ecology.

Benton County, WA												
Input Year	**Fuel**	**Vehicle Type**	**Emission**									
			VOC	**NOx**	**CO**	**PM10**	**PM2.5**	**SO2**	**CO2**	**CH4**	**N2O**	**CO2e**
2024	Diesel	Combination	0.18245	4.08130	2.00034	0.07144	0.06572	0.00542	1617.7	0.01996	0.00187	1618.7
		Combination	0.19133	3.85586	1.85778	0.06245	0.05746	0.00541	1616.8	0.03167	0.00291	1618.4
		Single Unit Long-haul	0.11464	1.55932	1.04570	0.03728	0.03430	0.00305	909.8	0.02010	0.00313	911.2
		Single Unit Short-haul	0.32730	1.85878	1.18535	0.03787	0.03484	0.00331	987.2	0.14565	0.00582	992.5
		Refuse Truck	0.28885	5.26539	2.30820	0.13000	0.11960	0.00575	1705.6	0.03780	0.00376	1707.6
		Light Commercial	0.25216	1.59025	1.72447	0.05833	0.05367	0.00199	589.2	0.04557	0.00301	590.4
		Passenger Car	0.19368	0.09464	3.90412	0.00255	0.00235	0.00110	329.4	0.00323	0.00068	329.6
	Gasoline	Combination	7.57169	6.25666	112.9196	0.06689	0.05917	0.01057	1590.7	0.28324	0.03486	1608.1
		Single Unit Long-haul	0.70314	0.32138	7.51225	0.01459	0.01291	0.00669	1007.1	0.02535	0.00864	1010.3
		Single Unit Short-haul	1.08079	0.60565	10.67867	0.03860	0.03415	0.00712	1071.7	0.06378	0.04355	1084.8
		Refuse Truck	3.54956	4.40078	38.29389	0.18183	0.16085	0.00789	1187.7	0.17365	0.07850	1215.3
		Light Commercial	0.27141	0.27620	4.88040	0.01095	0.00968	0.00293	440.5	0.02907	0.00876	443.6
		Passenger Car	0.26095	0.14939	3.96998	0.00685	0.00606	0.00212	319.4	0.02291	0.00492	321.2

Note: Emission factors (lb/VMT) for VOC, NOx, CO, PM10, SO2, and CO2e, were derived using the MOVES2014 model and inputs for calendar year 2024 using the de input files for Benton County from the State of Washington Department of Ecology.

Adapted from Tables 2.15-2 through 2.15-4 of EFSEC ASC

HORSE HEAVEN WIND FARMEPA NEI HAP Emission Factors for Nonroad Diesels

HAP emission factors for nonroad diesels (below) were obtained from ERG, "Documentation for Aircraft, Commercial Marine Vessel, Locomotive, and Other Nonroad Components of the National Emissions Inventory," Volume I - Methodology, October 7, 2003 (available from http://www.epa.gov/ttn/chief/net/1999inventory.html#final3haps), Appendix D, Tables D-1 through D-3. This is the reference cited by EPA's National Inventory Model (NMIM), i.e., US EPA, "EPA's National Inventory Model (NMIM), A Consolidated Emissions Modeling System for MOBILE6 and NONROAD", EPA420-R-05-024, December 2005 (available from http://www.epa.gov/otaq/models/nmim/420r05024.pdf), pp. 19-21.

Pollutant	Fraction of	Emissions Factor %
1,3-butadiene	VOC - Exhaust	0.0018616
formaldehyde	VOC	0.11815
benzene	VOC	0.020344
acetaldehyde	VOC	0.05308
ethylbenzene	VOC - Exhaust	0.0031001
styrene	VOC - Exhaust	0.00059448
acrolein	VOC	0.00303
toluene	VOC	0.014967
hexane	VOC	0.0015913
propionaldehyde	VOC	0.011815
2,2,4-trimethylpentane	VOC	0.000719235
2,3,7,8-TCDD TEQ **	tons TEQ/gal	1.90705E-14
xylenes	VOC	0.010582
Total HAP (ratioed to VOC)		**0.239834715**
PAH		
benz[a]anthracene	PM10	0.0000071
benzo[a]pyrene	PM10	0.00000035
benzo[b]fluoranthene	PM10	0.00000049
benzo[k]fluoranthene	PM10	0.00000035
chrysene	PM10	0.0000019
dibenzo[a,h]anthracene	PM10	2.9E-09
indeno[1,2,3-c,d]pyrene	PM10	0.000000079
acenaphthene	PM10	0.0001
acenaphthylene	PM10	0.000084
anthracene	PM10	0.00000043
benzo[g,h,i]perylene	PM10	0.00000019
fluoranthene	PM10	0.000017
fluorene	PM10	0.0001
naphthalene	PM10	0.00046
phenanthrene	PM10	0.00026
pyrene	PM10	0.0000029
Total HAP (ratioed to PM10)		**0.001034792**
chromium	ug/bhp-hr	0.03
manganese	ug/bhp-hr	1.37
nickel	ug/bhp-hr	2.035
Total HAP (Metals ug/bhp-hr)		**3.435**

** Note: the emission rate for 2,3,7,8-TCDD TEQ is significantly lower than any other HAP and therefore, was not factored into the total HAP emission factor.

Horse Heaven Fugitive Dust Emissions Summary
Construction Scenario

Emission Totals by Phase	PM10	PM2.5
	tons	tons
Phase 1		
Exposed surface windblown dust	20.46	10.23
Access road traffic fugitive dust	1,140.97	114.10
Fugitive PM Emissions from Bulldozing activities	1.79	0.88
Fugitive PM Emissions from Grading Activities	0.16	0.01
Total	1,163.38	125.22
Phase 2a		
Exposed surface windblown dust	16.15	8.08
Access road traffic fugitive dust	939.44	93.94
Fugitive PM Emissions from Bulldozing activities	2.06	1.01
Fugitive PM Emissions from Grading Activities	0.14	0.01
Total	957.79	103.05
Phase 2b		
Exposed surface windblown dust	30.33	15.17
Access road traffic fugitive dust	931.87	93.19
Fugitive PM Emissions from Bulldozing activities	1.70	0.84
Fugitive PM Emissions from Grading Activities	0.07	0.01
Total	963.97	109.19

Material Throughput and Vehicle Traffic Count on Unpaved Roads
Construction Phase 1, 2a and 2b
Horse Heaven Wind Farm

Parameters	Phase 1		Phase 2A		Phase 2B	
	Construction Traffic	Workforce	Construction Traffic	Workforce	Construction Traffic	Workforce
Operating Time						
Days per month	24	24	24	24	24	24
Number of Months	11	11	11	11	10	10
Total Operating Days (days) [a]	264	264	264	264	240	240
Daily Operating Hours (hrs/day)	12	12	2	2	2	10
Vehicle and Travel Data						
Vehicle Model [b]	Trucks	Pick up truck	Trucks	Pick up truck	Trucks	Pick up truck
Empty Vehicle Weight (tons) [c]	25.5	2.3	25.5	2.3	25.5	2.3
Vehicle Capacity (tons)	19.0	0.8	19.0	0.8	19.0	0.8
Loaded Vehicle Weight (tons)	44.5	3.0	44.5	3.0	44.5	3.0
W = Average Vehicle Weight (tons)	35.0	2.7	35.0	2.7	35.0	2.7
Number of Vehicles (duration)	52,584	63,360	42,212	56,496	39,618	65,040
Number of Vehicles (daily)	200	240	160	214	165	271
D = Distance traveled on unpaved roads (2-way miles) [d]	50.0	40.0	50.0	40.0	50.0	40.0
Daily Vehicle Miles Travelled (VMT)	10000.0	9600.0	8000.0	8560.0	8250.0	10840.0
Activity Duration Vehicle Miles Travelled (VMT)	2,629,200	2,534,400	2,110,600	2,259,840	1,980,900	2,601,600

Notes:

[a] Operating days and months are based on construction schedule information obtained from the Table Summary of Construction Schedule by Phase.

[b] Typical vehicle model to transport construction material. It assumed pick up trucks for workers.

[c] Empty vehicle weights were obtained from technical specifications of each vehicle.

[d] Hauling distance is conservatively assume that on road vehicles travel 50 miles per day and workers average daily round trip commute is approximately 40 miles per day.

Fugitive Particulate Matter (PM) Emissions from Vehicle Traffic on Unpaved Roads
Construction Phase 1, 2a and 2b
Horse Heaven Wind Farm

Parameters	Phase 1				Phase 2A				Phase 2B			
	Construction Traffic		Workforce		Construction Traffic		Workforce		Construction Traffic		Workforce	
	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
Vehicle and Travel Data [b]												
W = Average Vehicle Weight (tons)	35.0	35.0	2.7	2.7	35.0	35.0	2.7	2.7	35.0	35.0	2.7	2.7
D = Distance traveled on unpaved roads (2-way miles)	50.0	50.0	40.0	40.0	50.0	50.0	40.0	40.0	50.0	50.0	40.0	40.0
Daily Operation Hours (hrs/day)	12	12	12	12	2	2	2	2	2	2	10	10
Total No. of Operating Days for activity (days)	264	264	264	264	264	264	264	264	240	240	240	240
No. of truck trips per day (trucks/day)	200	200	240	240	160	160	214	214	165	165	271	271
Total No. of trucks for activity (trucks)	52,584	52,584	63,360	63,360	42,212	42,212	56,496	56,496	39,618	39,618	65,040	65,040
Daily Vehicle Miles Travelled (VMT)	10,000	10,000	9,600	9,600	8,000	8,000	8,560	8,560	8,250	8,250	10,840	10,840
Activity Duration Vehicle Miles Travelled (VMT)	2,629,200	2,629,200	2,534,400	2,534,400	2,110,600	2,110,600	2,259,840	2,259,840	1,980,900	1,980,900	2,601,600	2,601,600
Site Characteristics												
k = Particle size multiplier (lb/VMT) [e]	1.5	0.15	1.5	0.15	1.5	0.15	1.5	0.15	1.5	0.15	1.5	0.15
s = Silt content of site specific unpaved roads (%) [d]	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5
P = Mean annual number of days with precipitation greater than or equal to 0.01 inch (0.25 mm) [c]	72	72	72	72	72	72	72	72	72	72	72	72
a (constant, AP-42, Table 13.2.2-2)	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
b (constant, AP-42, Table 13.2.2-2)	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45
Control Efficiency												
Dust Control Efficiency (%) [f]	75	75	75	75	75	75	75	75	75	75	75	75
Emission Factors [a]												
Emission Factor (lb/VMT) - Daily	3.32	0.332	1.0	0.1	3.3	0.3	1.0	0.1	3.3	0.3	1.0	0.1
Emission Factor (lb/VMT) - Annual	2.67	0.27	0.83	0.08	2.67	0.27	0.83	0.08	2.67	0.27	0.83	0.08
Emission Rates [a]												
Uncontrolled Emission Factor (UEF) Equation - Daily (lb/day)	33,222.4	3,322.2	9,984.6	998.5	26,577.9	2,657.8	8,903.0	890.3	27,408.5	2,740.8	11,274.3	1,127.4
Uncontrolled Emission Factor (UEF) Equation - Duration (tons)	3,505.9	350.6	1,058.0	105.8	2,814.4	281.4	943.4	94.3	2,641.4	264.1	1,086.0	108.6
Controlled Daily Emissions (lb/day)	8,305.6	830.6	2,496.2	249.6	6,644.5	664.4	2,225.7	222.6	6,852.1	685.2	2,818.6	281.9
Controlled Annual Emissions (TPY)	876.5	87.6	264.5	26.4	703.6	70.4	235.8	23.6	660.4	66.0	271.5	27.2
Controlled Hourly Emissions (lb/hr, daily basis)	346.1	34.6	104.0	10.4	276.9	27.7	92.7	9.3	285.5	28.6	117.4	11.7
Emission Factor (lb/hr/mi)	13.8	1.4	5.2	0.5	11.1	1.1	4.6	0.5	11.4	1.1	5.9	0.6

Notes:

[a] Emission Factor (E) calculated from AP-42 Section 13.2.2 (Unpaved Roads) Equation 1a (Industrial Sites) -

E = k * (s/12)^a * (W/3)^b * (365-P)/365

[b] See Table 1 for number of vehicles and travel data.

[c] Particle size multiplier and constants from AP-42 Table 13.2.2-2 for industrial roads

[d] Silt content based on the Table 13.2.2-1 of AP-42 for Construction Sites

[e] Precipitation data based on annual summary data for 2020 Meteorological Data - Richland Airport (Benton County)

[f] Dust control efficiency based on 75% for basic watering on unpaved roads according to the Document Emission Factors for Paved and Unpaved Roads by the Department of Environmental Quality, State of Utah, January 2015

Fugitive PM Emissions from Bulldozers
Construction Phase 1
Horse Heaven Wind Farm

Parameters	Bulldozing/Scraping Activities		
	Wind	Solar	Battery
ID	**B1**	**B2**	**B3**
Operational Data [b]			
Daily Operation Hours (hrs/day)	12	12	12
Total No. of Operating Months for activity	8	10.1	4
No. of active bulldozers/loaders/excavators/scrapers (per month)	19	19	2
Site Characteristics [c]			
M = Moisture content (%)	3.4	3.4	3.4
s = Silt content of site specific unpaved roads (%)	7.5	7.5	7.5
Control Efficiency			
Dust Control Method [d]	Watering	Watering	Watering
Dust Control Efficiency (%)	70	70	70
Calculated PM Emission Factors (EF) [a]			
Uncontrolled TSP EF (lb/hr)	13.03	13.03	13.03
Controlled TSP EF (lb/hr)	3.91	3.91	3.91
Uncontrolled PM_{15} EF (lb/hr)	3.70	3.70	3.70
Controlled PM_{15} EF (lb/hr)	1.11	1.11	1.11
Uncontrolled PM_{10} EF (lb/hr)	2.78	2.78	2.78
Controlled PM_{10} EF (lb/hr)	0.83	0.83	0.83
Uncontrolled $PM_{2.5}$ EF (lb/hr)	1.37	1.37	1.37
Controlled $PM_{2.5}$ EF (lb/hr)	0.41	0.41	0.41
Estimated Emissions Rates (ER) [e]			
PM_{10} ER lb/hr (daily basis)	7.86	7.86	0.98
PM_{10} ER tons (year)	0.79	0.95	0.047
$PM_{2.5}$ ER lb/hr (daily basis)	3.88	3.88	0.48
$PM_{2.5}$ ER tons (year)	0.391	0.470	0.023

Notes:

[a] Emission Factor equations from Table 11.9-1 of US EPA AP-42 Section 11.9 for Western Surface Coal Mines, based on bulldozing for overburden:

Uncontrolled TSP EF (UEF) Equation :	UEF (lb/hr) = 5.7 x $(s)^{1.2}$/ $(M)^{1.3}$
Controlled TSP EF (CEF) Equation :	CEF (lb/hr) = UEF (lb/hr) x [100 - Control efficiency (%)]
Uncontrolled PM_{15} EF (UEF) Equation :	UEF (lb/hr) = 1.0 x $(s)^{1.5}$/ $(M)^{1.4}$
Controlled PM_{15} EF (CEF) Equation :	CEF (lb/hr) = UEF (lb/hr) x [100 - Control efficiency (%)]
Uncontrolled PM_{10} EF (UEF) Equation :	UEF (kg/hr) = 0.75 x UEF of PM_{15}
Controlled PM_{10} EF (CEF) Equation :	CEF (lb/hr) = UEF (lb/hr) x [100 - Control efficiency (%)]
Uncontrolled $PM_{2.5}$ EF (UEF) Equation :	UEF (kg/hr) = 0.105 x UEF of TSP
Controlled $PM_{2.5}$ EF (CEF) Equation :	CEF (lb/hr) = UEF (lb/hr) x [100 - Control efficiency (%)]

[b] The quantity of the bulldozers, operational hours and months were based on the Construction Emissions for Phase 1.

[c] Moisture content and silt sample data based on the Table 13.2.4-1 of the AP-42.

[d] Dust control efficiency based on 70% for basic watering with natural soil in place and applying water, when warranted to obtain and never exceed a 20% opacity limit, according to the Document Emission Factors by the Department of Environmental Quality, State of

[e] ER = EF x No. of active bulldozers.

Fugitive PM Emissions from Bulldozers
Construction Phase 2a
Horse Heaven Wind Farm

Parameters	Bulldozing/Scraping Activities		
	Wind	Solar	Battery
ID	**B4**	**B5**	**B6**
Operational Data [b]			
Daily Operation Hours (hrs/day)	12	12	12
Total No. of Operating Months for activity	6	10	4
No. of active bulldozers/loaders/excavators/scrapers (per month)	34	17	7
Site Characteristics [c]			
M = Moisture content (%)	3.4	3.4	3.4
s = Silt content of site specific unpaved roads (%)	7.5	7.5	7.5
Control Efficiency			
Dust Control Method [d]	Watering	Watering	Watering
Dust Control Efficiency (%)	70	70	70
Calculated PM Emission Factors (EF) [a]			
Uncontrolled TSP EF (lb/hr)	13.03	13.03	13.03
Controlled TSP EF (lb/hr)	3.91	3.91	3.91
Uncontrolled PM_{15} EF (lb/hr)	3.70	3.70	3.70
Controlled PM_{15} EF (lb/hr)	1.11	1.11	1.11
Uncontrolled PM_{10} EF (lb/hr)	2.78	2.78	2.78
Controlled PM_{10} EF (lb/hr)	0.83	0.83	0.83
Uncontrolled $PM_{2.5}$ EF (lb/hr)	1.37	1.37	1.37
Controlled $PM_{2.5}$ EF (lb/hr)	0.41	0.41	0.41
Estimated Emissions Rates (ER) [e]			
PM_{10} ER lb/hr (daily basis)	14.01	6.88	2.95
PM_{10} ER tons (year)	1.08	0.84	0.142
$PM_{2.5}$ ER lb/hr (daily basis)	6.90	3.39	1.45
$PM_{2.5}$ ER tons (year)	0.533	0.412	0.070

Notrs:

[a] Emission Factor equations from Table 11.9-1 of US EPA AP-42 Section 11.9 for Western Surface Coal Mines, based on bulldozing for overburden:

Uncontrolled TSP EF (UEF) Equation :	UEF (lb/hr) = 5.7 x $(s)^{1.2}/(M)^{1.3}$
Controlled TSP EF (CEF) Equation :	CEF (lb/hr) = UEF (lb/hr) x [100 - Control efficiency (%)]
Uncontrolled PM_{15} EF (UEF) Equation :	UEF (lb/hr) = 1.0 x $(s)^{1.5}/(M)^{1.4}$
Controlled PM_{15} EF (CEF) Equation :	CEF (lb/hr) = UEF (lb/hr) x [100 - Control efficiency (%)]
Uncontrolled PM_{10} EF (UEF) Equation :	UEF (kg/hr) = 0.75 x UEF of PM_{15}
Controlled PM_{10} EF (CEF) Equation :	CEF (lb/hr) = UEF (lb/hr) x [100 - Control efficiency (%)]
Uncontrolled $PM_{2.5}$ EF (UEF) Equation :	UEF (kg/hr) = 0.105 x UEF of TSP
Controlled $PM_{2.5}$ EF (CEF) Equation :	CEF (lb/hr) = UEF (lb/hr) x [100 - Control efficiency (%)]

[b] The quantity of the bulldozers, operational hours and months were based on the Construction Emissions for Phase 2a.

[c] Moisture content and silt sample data based on the Table 13.2.4-1 of the AP-42.

[d] Dust control efficiency based on 70% for basic watering with natural soil in place and applying water, when warranted to obtain and never exceed a 20% opacity limit, according to the Document Emission Factors by the Department of Environmental Quality, State of Utah, January 2015

[e] ER = EF x No. of active bulldozers.

Fugitive PM Emissions from Bulldozers

Construction Phase 2b

Horse Heaven Wind Farm

Parameters	Bulldozing/Scraping Activities
	Wind
ID	**B7**
Operational Data [b]	
Daily Operation Hours (hrs/day)	12
Total No. of Operating Months for activity	10
No. of active bulldozers/ loaders/ excavators/ scrapers (per month)	34
Site Characteristics [c]	
M = Moisture content (%)	3.4
s = Silt content of site specific unpaved roads (%)	7.5
Control Efficiency	
Dust Control Method [d]	Watering
Dust Control Efficiency (%)	70
Calculated PM Emission Factors (EF) [a]	
Uncontrolled TSP EF (lb/hr)	13.03
Controlled TSP EF (lb/hr)	3.91
Uncontrolled PM_{15} EF (lb/hr)	3.70
Controlled PM_{15} EF (lb/hr)	1.11
Uncontrolled PM_{10} EF (lb/hr)	2.78
Controlled PM_{10} EF (lb/hr)	0.83
Uncontrolled $PM_{2.5}$ EF (lb/hr)	1.37
Controlled $PM_{2.5}$ EF (lb/hr)	0.41
Estimated Emissions Rates (ER) [e]	
PM_{10} ER lb/hr (daily basis)	14.01
PM_{10} ER tons (year)	1.70
$PM_{2.5}$ ER lb/hr (daily basis)	6.90
$PM_{2.5}$ ER tons (year)	0.837

Notes:

[a] Emission Factor equations from Table 11.9-1 of US EPA AP-42 Section 11.9 for Western Surface Coal Mines, based on bulldozing for overburden:

Uncontrolled TSP EF (UEF) Equation :	UEF (lb/hr) = 5.7 x $(s)^{1.2}/(M)^{1.3}$
Controlled TSP EF (CEF) Equation :	CEF (lb/hr) = UEF (lb/hr) x [100 - Control efficiency (%)]
Uncontrolled PM_{15} EF (UEF) Equation :	UEF (lb/hr) = 1.0 x $(s)^{1.5}/(M)^{1.4}$
Controlled PM_{15} EF (CEF) Equation :	CEF (lb/hr) = UEF (lb/hr) x [100 - Control efficiency (%)]
Uncontrolled PM_{10} EF (UEF) Equation :	UEF (kg/hr) = 0.75 x UEF of PM_{15}
Controlled PM_{10} EF (CEF) Equation :	CEF (lb/hr) = UEF (lb/hr) x [100 - Control efficiency (%)]
Uncontrolled $PM_{2.5}$ EF (UEF) Equation :	UEF (kg/hr) = 0.105 x UEF of TSP
Controlled $PM_{2.5}$ EF (CEF) Equation :	CEF (lb/hr) = UEF (lb/hr) x [100 - Control efficiency (%)]

[b] The quantity of the bulldozers, operational hours and months were based on the Construction Emissions for Phase

[c] Moisture content and silt sample data based on the Table 13.2.4-1 of the AP-42.

[d] Dust control efficiency based on 70% for basic watering with natural soil in place and applying water, when warranted to obtain and never exceed a 20% opacity limit, according to the Document Emission Factors by the Department of Environmental Quality, State of Utah, January 2015

[e] ER = EF x No. of active bulldozers.

Fugitive Particulate Matter (PM) Emissions from Grading Activities
Construction Phase 1
Horse Heaven Wind Farm

Parameters	**Grading Activities during Phase 1**		
	Wind	**Solar**	**Battery**
ID	**G1**	**G2**	**G3**
Operational Data [a]			
Daily Operation Hours (hrs/day)	12	12	12
Total No. of Operating Months	8	10	4
No. of active motor graders per month	19	14	2
Vehicle Data			
Mean Vehicle Speed (S) (mph) [b]	3.3	3.3	3.3
Basis for vehicle miles traveled (VMT)			
Number of vehicles			
daily	7	7	7
annually	159	71	28
Grader Utilization per day (%)	50	50	50
Distance traveled/vehicle/day (miles per grader)	19.8	19.8	19.8
VMT (no. vehicles x mi traveled)			
daily	138.6	138.6	138.6
annually	1164.2	1399.9	554.4
Control Efficiency			
Dust Control Method [c]	Watering	Watering	Watering
Dust Control Efficiency (%)	70	70	70
Scaling Factors (unitless)			
TSP	1.0	1.0	1.0
PM_{15}	1.0	1.0	1.0
PM_{10}	0.6	0.6	0.6
$PM_{2.5}$	0.031	0.031	0.031
Calculated Emission Factors (EF) [d]			
Uncontrolled TSP EF (lb/VMT)	0.79	0.79	0.79
Uncontrolled PM_{15} EF (lb/VMT)	0.56	0.56	0.56
Uncontrolled PM_{10} EF (lb/VMT)	0.33	0.33	0.33
Uncontrolled $PM_{2.5}$ EF (lb/VMT)	0.02	0.02	0.02
Estimated Uncontrolled Emission Rate (ER) [e]			
TSP ER lb/hr (daily basis)	4.57	4.57	4.57
tons/yr	0.46	0.55	0.22
PM_{10} ER lb/hr (daily basis)	1.92	1.92	1.92
tons/yr	0.19	0.23	0.09
$PM_{2.5}$ ER lb/hr (daily basis)	0.14	0.14	0.14
tons/yr	0.01	0.02	0.01
Estimated Controlled Emission Rate (ER)			
TSP ER lb/hr (daily basis)	1.37	1.37	1.37
tons/yr	0.14	0.17	0.07
PM_{10} ER lb/hr (daily basis)	0.58	0.58	0.58
tons/yr	0.06	0.07	0.03
$PM_{2.5}$ ER lb/hr (daily basis)	0.04	0.04	0.04
tons/yr	0.00	0.01	0.00

Notes:

[a] The quantity of the graders, operational hours and months were based on the Construction Emissions for Phase 1

[b] Mean vehicle speed for graders based on the grader operations' time estimations by http://www.ocw.upj.ac.id/

[c] Dust control efficiency based on 70% for basic watering with natural soil in place and applying water, when warranted to obtain and never exceed a 20% opacity limit, according to the Document Emission Factors by the Department of Environmental Quality, State of Utah, January 2015

[d] Emission Factor equations from Table 11.9-1 of US EPA AP-42 Section 11.9 for Western Surface Coal Mines, based on grading

Uncontrolled PM_{15} EF (UEF) Equation — UEF (lb/VMT) = 0,051 x $S^{2,0}$ x Scaling Factor

Uncontrolled TSP EF (UEF) Equation — UEF (lb/VMT) = $0.040(S)^{2.5}$ x Scaling Factor

PM10 EF = PM15 EF x Scaling factor for PM-10

PM2.5 EF = TSP EF x Scaling factor for PM-2.5

[e] ER = EF x VMT

Fugitive Particulate Matter (PM) Emissions from Grading Activities
Construction Phase 2a
Horse Heaven Wind Farm

Parameters	Grading Activities during Phase 2a		
	Wind	**Solar**	**Battery**
ID	**G4**	**G5**	**G6**
Operational Data [a]			
Daily Operation Hours (hrs/day)	12	12	12
Total No. of Operating Months	6	10	4
No. of active motor graders per month	24	12	14
Vehicle Data			
Mean Vehicle Speed (S) (mph) [b]	3.3	3.3	3.3
Basis for vehicle miles traveled (VMT)			
Number of vehicles			
daily	7	7	7
annually	152	71	28
Grader Utilization per day (%)	50	50	50
Distance traveled/vehicle/day (miles per grader)	19.8	19.8	19.8
VMT (no. vehicles x mi traveled)			
daily	138.6	138.6	138.6
annually	891.7	1404.5	554.4
Control Efficiency			
Dust Control Method [c]	Watering	Watering	Watering
Dust Control Efficiency (%)	70	70	70
Scaling Factors (unitless)			
TSP	1.0	1.0	1.0
PM_{15}	1.0	1.0	1.0
PM_{10}	0.6	0.6	0.6
$PM_{2.5}$	0.031	0.031	0.031
Calculated Emission Factors (EF) [d]			
Uncontrolled TSP EF (lb/VMT)	0.79	0.79	0.79
Uncontrolled PM_{15} EF (lb/VMT)	0.56	0.56	0.56
Uncontrolled PM_{10} EF (lb/VMT)	0.33	0.33	0.33
Uncontrolled $PM_{2.5}$ EF (lb/VMT)	0.02	0.02	0.02
Estimated Uncontrolled Emission Rate (ER) [e]			
TSP ER lb/hr (daily basis)	4.57	4.57	4.57
tons/yr	0.35	0.56	0.22
PM_{10} ER lb/hr (daily basis)	1.92	1.92	1.92
tons/yr	0.15	0.23	0.09
$PM_{2.5}$ ER lb/hr (daily basis)	0.14	0.14	0.14
tons/yr	0.01	0.02	0.01
Estimated Controlled Emission Rate (ER)			
TSP ER lb/hr (daily basis)	1.37	1.37	1.37
tons/yr	0.11	0.17	0.07
PM_{10} ER lb/hr (daily basis)	0.58	0.58	0.58
tons/yr	0.04	0.07	0.03
$PM_{2.5}$ ER lb/hr (daily basis)	0.04	0.04	0.04
tons/yr	0.00	0.01	0.00

Notes:

[a] The quantity of the graders, operational hours and months were based on the Construction Emissions for Phase 2a

[b] Mean vehicle speed for graders based on the grader operations' time estimations by http://www.ocw.upj.ac.id/

[c] Dust control efficiency based on 70% for basic watering with natural soil in place and applying water, when warranted to obtain and never exceed a 20% opacity limit, according to the Document Emission Factors by the Department of Environmental Quality, State of Utah, January 2015

[d] Emission Factor equations from Table 11.9-1 of US EPA AP-42 Section 11.9 for Western Surface Coal Mines, ba

Uncontrolled PM_{15} EF (UEF) Equation — UEF (lb/VMT) = $0,051 \times S^{2,0}$ x Scaling Factor

Uncontrolled TSP EF (UEF) Equation — UEF (lb/VMT) = $0.040(S)^{2.5}$ x Scaling Factor

PM10 EF = PM15 EF x Scaling factor for PM-10

PM2.5 EF = TSP EF x Scaling factor for PM-2.5

[e] ER = EF x VMT

Fugitive Particulate Matter (PM) Emissions from Grading Activities
Construction Phase 2b
Horse Heaven Wind Farm

Parameters	Grading Activities during Phase 2b
	Wind
ID	**G7**
Operational Data [a]	
Daily Operation Hours (hrs/day)	12
Total No. of Operating Months	10
No. of active motor graders per month	25
Vehicle Data	
Mean Vehicle Speed (S) (mph) [b]	3.3
Basis for vehicle miles traveled (VMT)	
Number of vehicles	
daily	7
annually	250
Grader Utilization per day (%)	50
Distance traveled/vehicle/day (miles per grader)	19.8
VMT (no. vehicles x mi traveled)	
daily	138.6
annually	1399.9
Control Efficiency	
Dust Control Method [c]	Watering
Dust Control Efficiency (%)	70
Scaling Factors (unitless)	
TSP	1.0
PM_{15}	1.0
PM_{10}	0.6
$PM_{2.5}$	0.031
Calculated Emission Factors (EF) [d]	
Uncontrolled TSP EF (lb/VMT)	0.79
Uncontrolled PM_{15} EF (lb/VMT)	0.56
Uncontrolled PM_{10} EF (lb/VMT)	0.33
Uncontrolled $PM_{2.5}$ EF (lb/VMT)	0.02
Estimated Uncontrolled Emission Rate (ER) [e]	
TSP ER lb/hr (daily basis)	4.57
tons/yr	0.55
PM_{10} ER lb/hr (daily basis)	1.92
tons/yr	0.23
$PM_{2.5}$ ER lb/hr (daily basis)	0.14
tons/yr	0.02
Estimated Controlled Emission Rate (ER)	
TSP ER lb/hr (daily basis)	1.37
tons/yr	0.17
PM_{10} ER lb/hr (daily basis)	0.58
tons/yr	0.07
$PM_{2.5}$ ER lb/hr (daily basis)	0.04
tons/yr	0.01

Notes:

[a] The quantity of the graders, operational hours and months were based on the Construction Emissions for Phase 2b.

[b] Mean vehicle speed for graders based on the grader operations' time estimations by http://www.ocw.upj.ac.id/

[c] Dust control efficiency based on 70% for basic watering with natural soil in place and applying water, when warranted to obtain and never exceed a 20% opacity limit, according to the Document Emission Factors by the Department of Environmental Quality, State of Utah, January 2015

[d] Emission Factor equations from Table 11.9-1 of US EPA AP-42 Section 11.9 for Western Surface Coal Mines, based on grading

Uncontrolled PM_{15} EF (UEF) Equation — UEF (lb/VMT) = 0,051 x $S^{2,0}$ x Scaling Factor
Uncontrolled TSP EF (UEF) Equation — UEF (lb/VMT) = $0.040(S)^{2.5}$ x Scaling Factor

PM10 EF = PM15 EF x Scaling factor for PM-10
PM2.5 EF = TSP EF x Scaling factor for PM-2.5

[e] ER = EF x VMT

Fugitive PM Emissions from Wind Erosion of Exposed Surface Areas
Construction Phase 1, 2a and 2b
Horse Heaven Wind Farm

Parameters	Exposed surface windblown dust		
	Construcion Phase 1	**Construcion Phase 2a**	**Construcion Phase 1**
ID	**WE1**	**WE1**	**WE1**
Operational Data			
Hours of Exposure (hrs/day)	24	24	24
Unvegetated Surface Area (acres) [b]	358.9	283.4	532.1
Site Characteristics [c]			
Daily hours of precipitation ≥ 0.25 mm (p)	0	0	0
Annual days of precipitation ≥ 0.25 mm (p)	72	72	72
Control Efficiency			
Dust Control Method [d]	Watering as needed	Watering as needed	Watering as needed
Dust Control Efficiency (%) [d]	70	70	70
Particle Size Multipliers (k) [e]			
For TSP	1.0	1.0	1.0
For PM_{10}	0.50	0.50	0.50
For $PM_{2.5}$	0.25	0.25	0.25
Calculated PM Emission Factors (EF) [a]			
Uncontrolled TSP EF (ton/acre/yr)	0.38	0.38	0.38
Uncontrolled PM_{10} EF (ton/acre/yr)	0.19	0.19	0.19
Uncontrolled $PM_{2.5}$ EF (ton/acre/yr)	0.095	0.095	0.095
Controlled TSP EF (ton/acre/yr)	0.11	0.11	0.11
Controlled PM_{10} EF (ton/acre/yr)	0.06	0.06	0.06
Controlled $PM_{2.5}$ EF (ton/acre/yr)	0.029	0.029	0.029
Estimated Emissions Rates [a]			
TSP ER lb/hr (daily basis)	9.34	7.38	13.85
TSP ER tons (year)	40.91	32.31	60.66
PM_{10} ER lb/hr (daily basis)	4.67	3.69	6.92
PM_{10} ER tons (year)	20.46	16.15	30.33
$PM_{2.5}$ ER lb/hr (daily basis)	2.34	1.84	3.46
$PM_{2.5}$ ER tons (year)	10.23	8.08	15.17

Notes:

[a] Emission factor equation from Table 11.9-4 (wind erosion of exposed areas) of US EPA AP-42 Section 11.9 for Western Surface Coal Mines:

Uncontrolled TSP EF (UEF) Equation : UEF (ton/acre/yr) = k x 0.38

Controlled TSP EF (CEF) Equation : CEF (ton/acre/yr) = UEF (ton/acre/yr) x [100 - Control efficiency (%)]

[b] Area of unvegetated surface (temporary and permanent disturbance) based on the Table 2.1-1 Project Related Impacts.

[c] Based on hourly surface 2020 meteorological data from the Richland Airport (Benton County)

[d] Dust control efficiency based on 70% for basic watering with natural soil in place and applying water, when warranted to obtain and never exceed a 20% opacity limit, according to the Document Emission Factors by the Department of Environmental Quality, State of Utah, January 2015

[e] Particle size based on AP-42 Section 13.2.5 recommendation.

APPENDIX 4.6-1

GAL 2022 Wind Turbine Wildlife Collision Risk Assessment

This Page Intentionally Left Blank

REPORT

Wind Turbine Wildlife Collision Risk Assessment

Horse Heaven Wind Farm

Submitted to:

Horse Heaven Wind Farm, LLC

5775 Flatiron Parkway, Suite 120
Boulder, CO 80301

Submitted by:

Golder Associates Ltd.

Suite 200 - 2920 Virtual Way, Vancouver, British Columbia, V5M 0C4, Canada

+1 604 296 4200

April 2022

Executive Summary

Horse Heaven Wind Farm, LLC (the Applicant) is proposing to develop the Horse Heaven Wind Farm (the Project) in Benton County, Washington. The Applicant is considering two general turbine options comprising four different turbine technologies. The four turbine technologies presented in the Application for Site Certification are examples of available technologies and are not prescriptive of what might be available at the time of construction. Under Option 1, turbines would be shorter and have a smaller rotor diameter than under Option 2. Option 2 would involve fewer turbines because each turbine would have a higher energy production capability. This special study report compares the potential bird and bat collision risk associated with each turbine option based on existing information collected during baseline studies conducted for the Project and a review of published scientific literature pertaining to bird and bat interactions with wind turbines.

Baseline studies conducted by the Applicant considered in this special study report are avian use surveys (AUS) and acoustic bat surveys. AUS were conducted for the Project and used to determine a relative index of bird exposure, which is a relative measure of species-specific risk to turbine collisions that considers each species' local abundance, proportion of observations in flight, and observed flight heights. Exposure indices are available for eight special status bird species and were compared between turbine technologies to evaluate relative collision risk.

Acoustic bat surveys were conducted by the Applicant to estimate bat activity levels within the Project area during the known regional period of bat activity. Acoustic detectors were deployed at four sites in and around the Project Lease Boundary with paired microphones placed near ground level and approximately 148 feet (45 m) above ground level on a meteorological tower. Eight bat species were documented during acoustic bat surveys in and around the Lease Boundary. Most recorded bat passes were produced by three low-frequency bat species: silver-haired bat *(Lasionycteris noctivagans)*, hoary bat *(Lasiurus cinereus)*, and big brown bat *(Eptesicus fuscus)*.

The literature review suggests that the effect of turbine height and rotor swept area on bird collision mortalities remains uncertain (AWWI 2021). Some studies did not find a relationship between bird mortality rates and turbine height (Everaert 2014; Barclay et al. 2007; Krijgsveld et al. 2009). Other studies report higher bird mortality rates at taller turbines on a per turbine basis (Loss et al. 2013; De Lucas et al. 2008, Thelander et al. 2003) but lower mortality rates per unit of energy generation (Thaxter et al. 2017), although this is not unequivocal (Huso et al. 2021). Nevertheless, replacing several small turbines with fewer larger turbines has been hypothesized to reduce bird collision risk, particularly for raptors (Arnett and May 2016; Dahl et al. 2015; Thaxter et al. 2017).

Collision with turbines is considered one of the greatest threats to bats in North America (O'Shea et al. 2016). Three species of migratory tree-roosting bats (i.e., eastern red bat *[Lasiurus borealis]*, silver-haired bat, hoary bat) make up most bat mortalities resulting from turbine collision, raising concerns about population-level impacts as the number of wind farms increases (Barclay et al. 2007; Zimmerling and Francis 2016; Hein and Schirmacher 2016). However, there is limited and conflicting information about the effect of turbine height on bat collision mortalities. Some studies report that bat mortality rates increase with turbine size (Baerwald and Barclay 2009), including on a per megawatt (MW) basis (Barclay et al. 2007), while others report no effect (Huso et al. 2021), the opposite effect (Fielder et al. 2007), or that mortality rates increase on either side of an optimum intermediate turbine size (Thaxter et al. 2017).

The following provides a summary of anticipated wildlife collision risk associated with the two turbine options based on information collected during baseline studies and a review of available published scientific literature:

- Based on AUS data:
  - Mean exposure indices for small bird species were highest at the GE 3.03-MW turbines (Option 1) and similar across the three other turbine technologies. Therefore, Option 1 is expected to result in a greater number of small bird mortalities.
  - Among large bird species, exposure indices for raptors were higher for shorter turbines (Option 1), but exposure indices for waterfowl were higher at taller turbines (Option 2). It is expected that the option requiring a greater number of shorter turbines (Option 1) would result in more large bird mortalities because raptors appear more susceptible to turbine collisions than waterfowl (AWWI 2021).
  - Option 1 is expected to result in greater collision risk for six of the eight special status bird species observed during AUS (ferruginous hawk *[Buteo regalis]*, golden eagle *[Aquila chrysaetos]*, prairie falcon *[Falco mexicanus]*, tundra swan *[Cygnus columbianus]*, American white pelican *{Pelecanus erythrorhycnhos]*, great blue heron *[Ardea herodias]*). Exposure indices were highest for Option 2 technologies for two special status bird species (sandhill crane *[Grus canadensis]*, bald eagle *[Haliaeetus leucocephalus]*), but it is uncertain to what degree this may be offset by fewer turbines.
- Based on a literature review, the weight of evidence suggests that per unit of energy output, a wind farm layout with fewer larger turbines (i.e., Option 2) is likely to have fewer total bird mortalities than one with a greater number of smaller turbines (i.e., Option 1).
- The relationship between turbine height and bat collision mortalities is too inconclusive to make confident predictions regarding which turbine option is expected to result in fewer bat mortalities.

It is important to acknowledge that there is uncertainty associated with these conclusions related to conflicting results in available published scientific studies, lack of studies at turbines within the range of heights considered for the Horse Heaven Wind Farm, and potential for substantial variability in wildlife mortality based on local factors (e.g., bird abundance, species composition, topography, habitat, spatial arrangement of turbines). These sources of uncertainty limit the confidence of predicted wildlife mortality risk associated with the two turbine options.

Table of Contents

TABLES

APPENDICES

1.0 INTRODUCTION

Horse Heaven Wind Farm, LLC (the Applicant) is proposing to develop the Horse Heaven Wind Farm (the Project) in Benton County, Washington. The Applicant is considering two general turbine options comprising four different turbine technologies to facilitate flexible turbine siting (Table 1). The turbine technologies are examples of available technologies and are not prescriptive of what might be available at the time of construction. Under Option 1, turbines would be shorter and have a smaller rotor diameter than under Option 2. Option 2 would involve fewer turbines because each turbine would have a higher energy production capability. Golder Associates Ltd. (Golder) was retained to complete this special study report comparing the potential bird and bat collision risk associated with each turbine option.

2.0 METHODS

Each turbine option has two possible turbine technologies (see Table 1). The specifications for each type served as the basis for evaluating bird and bat collision risk associated with Option 1 and Option 2.

Table 1: Potential Turbine Specifications

Turbine Parameters/Features	Turbine Option 1		Turbine Option 2	
	GE 2.82 MW Turbine	GE 3.03 MW Turbine	GE 5.5 MW Turbine	SG 6.0 MW Turbine
Tower Type	Tubular	Tubular	Tubular	Tubular steel / hybrid
Maximum Number of Turbines Considered	244	244	150	150
Turbine Rotor Diameter	127 m / 417 ft	140 m / 459 ft	158 m / 518 ft	170 m /557 ft
Turbine Hub Height (ground to nacelle)	89 m / 292 ft	81 m / 266 ft	125 m / 411 ft	113 m / 377 ft
Maximum Total Height (ground to blade tip)	152 m / 499 ft	151 m / 496 ft	204 m / 671 ft	200 m / 657 ft
Tower Base Diameter	4.6 m / 15.1 ft	4.6 m / 15.1 ft	4.6 m / 15.1 ft	4.7 m / 15.5 ft

Source: Table 2.3-1 of the Application for Site Certification (Horse Heaven Wind Farm, LLC 2021)

ft = feet; GE = General Electric; MW = megawatts; m = meters; SG = Siemens Gamesa

Bird and bat collision risk associated with the two general turbine options was evaluated based on site-specific information collected during baseline studies conducted for the Project and presented in the Application for Site Certification (ASC) to the Washington Energy Facility Site Evaluation Council (Horse Heaven Wind Farm LLC, 2021), in combination with a review of published scientific literature pertaining to bird and bat interactions with wind turbines.

2.1 Baseline Studies

The following sections provide an overview of baseline studies conducted for the Project and how those data were used in this special study report. For detailed information related to baseline wildlife studies, refer to Section 3.4.1.3 of the ASC and Appendices K and M to the ASC (Horse Heaven Wind Farm, LLC 2021).

2.1.1 Avian Use Surveys

Avian use surveys (AUS) were conducted for the Project from 2017 to 2020 to document temporal and spatial use of the Lease Area by small and large bird species. AUS consisted of 10-minute, 100-meter (m) circular plot point counts for small birds and 60-minute, 800-m circular plot point counts for large birds. During both survey methodologies, biologists recorded the bird species observed, number of individuals, distance, flight height and direction, and habitat types.

Data from AUS conducted during all years, survey areas, and seasons were aggregated to calculate a relative index of bird exposure, *R*, which is a relative measure of species-specific risk of turbine collision, using the following formula:

$$R = A \times P_f \times P_t$$

- *A* equals the mean relative use (i.e., average number of observations per survey plot) for a particular species (i.e., species *i*). Mean relative use was calculated by summing the total number of observations within each plot during a visit, then averaging across all survey plots within each visit, followed by averaging across visits within each season, and finally averaging seasonal values weighted by the number of days in each season;
- P_f equals the proportion of all observations of species *i* where activity was recorded as flying; and
- P_t equals the proportion of all initial flight height observations of species *i* within the rotor swept height for the proposed turbine.

The exposure index provides a relative measure of species-specific collision risk with a wind turbine at the Project based on their local abundance, proportion of flying observations, and flight heights. The exposure index can also be used to compare relative collision risk for a particular species between turbines with different rotor swept zones. A greater exposure index value represents higher collision risk. For example, a species with an exposure index of 0.20 is ten times more likely to be exposed to collision with a wind turbine than a species with an exposure index of 0.02. However, the exposure index is not directly translatable to the number of bird mortalities. This is partly because it does not take into consideration habitat selection, flight movements relative to proposed turbine siting, or species-specific ability to detect and avoid turbines.

Exposure indices for Option 1 and Option 2 turbine technologies were compared to evaluate bird collision risk. However, the relative index of exposure does not consider the number of turbines required for each option. If the exposure index for Option 1 technologies is greater than for Option 2 technologies, it was assumed that the overall collision risk for Option 1 is also greater because it consists of a larger number of turbines. However, the opposite does not necessarily hold true. If the exposure index for Option 2 technologies is greater than Option 1 technologies, collision risk could still be offset by fewer turbines, depending on the magnitude of the differences in the exposure indices and the number of turbines. Unfortunately, there is no clear mathematical relationship between the exposure index and number of turbines. Therefore, assessment of mortality risk based on exposure indices was evaluated qualitatively.

2.1.2 Acoustic Bat Surveys

The objective of acoustic bat surveys was to estimate bat activity levels within the Project area during the known regional period of bat activity. Acoustic surveys were conducted at four sites in and around the Project Lease Boundary from August through October in 2017 and from May through October in 2018 using a combination of Anabat SD2 Active Bat Detector and Wildlife Acoustic Song Meter SM3 full-spectrum acoustic detectors. At each site, one microphone was deployed near ground level, at approximately 5 feet (1.5 m) above ground level, and another was raised on the same meteorological tower to approximately 148 feet (45 m) above ground level. Three detector sites were in grassland habitat and one detector site was in shrub-steppe habitat. Bat activity recorded at detectors was summarized as the number of total passes, as well as passes by high-frequency (>30 kilohertz [kHz]) and low-frequency (<30 kHz) bat groups.

The relationship between pre-construction bat acoustic activity and post-construction bat mortality rates at wind farms has been debated in scientific literature (Hein et al. 2013). Based on an analysis of paired pre- and post-construction studies from 49 wind farms in the United States and Canada, Solick et al. (2020) found that pre-development bat activity rates did not predict bat mortality rates during operation. A possible explanation for the lack of a predictive relationship is that some bat species may be attracted to wind turbines as hypothesized by several studies (AWWI 2021; Arnett and May 2016; Guest et al. 2022). There is uncertainty around the causes of attraction and information at the species-level is limited (Guest et al. 2022). Therefore, information from acoustic bat surveys was primarily used to focus the literature review on bat species present within the Project Lease Boundary instead of attempting to use pre-construction bat activity as a predictor of bat mortality.

3.0 RESULTS

3.1 Birds

3.1.1 Avian Use Studies

Species-specific exposure indices derived from AUS are presented in Appendix A. The exposure indices represent relative collision risk but are not directly translatable to the number of bird mortalities due to factors such as species-specific collision avoidance.

3.1.1.1 Small Bird Species

The number of small bird species with non-zero exposure indices for each turbine technology was nine species for the GE 2.82-megawatt (MW) turbine (Option 1), 16 species for the General Electric (GE) 3.03-MW turbine (Option 1), two species at the GE 5.5-MW turbine (Option 2), and six species at the Siemens Gamesa (SG) 6.0-MW turbine (Option 2). Non-zero species-specific mean exposure indices were highest for all small bird species at the GE 3.03-MW turbines (Option 1) and similar across the three other turbine technologies. Exposure indices were generally low, ranging from 0.001 to 0.312 for all species and turbine technologies, except for horned lark (*Eremophila alpestris*) at the Option 1, GE 3.03 MW turbines (exposure index of 1.275). Based on these exposure indices, it is expected that collision risk for small bird species would be greater for Option 1 technologies, especially the GE 3.03-MW turbine, than Option 2 technologies. Because Option 1 would require a greater number of turbines than Option 2, it is also expected that small bird mortalities would be greater under Option 1 than Option 2. Studies show that, for small passerine (i.e., songbird) species, turbine-related mortalities resulting from currently developed wind farms constitute a small percentage of their total population size (<0.045%) (Erickson et al. 2014) and do not appear likely to lead to population-level impacts (AWWI 2021).

3.1.1.2 Large Bird Species

The number of large bird species with non-zero exposure indices was similar for all turbine technologies, ranging from 34 species for the GE 3.03-MW turbine (Option 1) to 29 species for the GE 5.5-MW turbine (Option 2). In general, exposure indices for raptors were higher for shorter turbines than taller turbines. Conversely, exposure indices for waterfowl (i.e., ducks, geese, and swans) were higher at taller turbines. However, mortalities of waterbirds and waterfowl are relatively infrequent at land-based wind farms, whereas diurnal raptors appear more susceptible (AWWI 2021). Therefore, it is expected that the option requiring a greater number of shorter turbines (Option 1) would result in a greater number of large bird mortalities. Large bird species that are slow to mature and have a low reproductive rate may be more susceptible to population-level impacts from collision mortality (Watson et al. 2018). Demographic modeling suggests potential for population-level impacts for some raptor species, including ferruginous hawk *(Buteo regalis)* and golden eagle *(Aquila chrysaetos)*, based on future wind energy projections (Diffendorfer et al. 2021).

3.1.1.3 Special Status Bird Species

Conservation status of wildlife species reflects their existing population size and trends. Special status bird species are likely less resilient to population declines, and it is prudent to consider their species-specific potential for collision mortality associated with the two turbine options. For the purposes of the ASC, special status bird species were defined as species listed under the U.S. Endangered Species Act, state-listed endangered species, state-listed threatened species, state-listed sensitive species, state-listed candidate species, Washington Department of Fish and Wildlife priority species, and eagles (Horse Heaven Wind Farm LLC, 2021). Fourteen special status bird species have potential to occur within the Project Lease Boundary, with 13 species documented in the Project Lease Boundary (Horse Heaven Wind Farm LLC, 2021). Mean exposure indices from AUS conducted for the Project are available for eight special status bird species. Mean exposure indices are not available for the following six special status bird species: burrowing owl *(Athene cunicularia)*, loggerhead shrike *(Lanius ludovicianus)*, ring-necked pheasant *(Phasianus colchicus)*, sagebrush sparrow *(Artemisiospiza nevadensis)*, sage thrasher *(Oreoscoptes montanus)*, and Vaux's swift *(Chaetura vauxi).* For the eight species with data, the exposure indices for the different turbine technologies under consideration for the Project are discussed below and summarized in Table 2.

- American white pelican *(Pelecanus erythrorhycnhos)*: Exposure indices for American white pelican are similar for all turbine technologies, ranging from 0.289 for Option 1 technologies to 0.303 for Option 2 technologies (Table 2). However, the Applicant has excluded areas of the highest observed use by American white pelican from the Project Lease Boundary, which reduces the turbine collision exposure for this species. Based on the observed similarities in exposure indices across all turbine technologies, it is expected that the option requiring more turbines (Option 1) would result in greater collision risk for American white pelicans.

- Sandhill crane *(Grus canadensis)*: The exposure index for sandhill cranes for Option 1 technologies is approximately eight times less than Option 2 technologies (Table 2). Sandhill cranes have the highest mean use of the special status bird species observed during AUS. However, sandhill cranes may not be particularly susceptible to collision risk with turbines. Studies at wind facilities in other parts of the United States have shown that sandhill cranes are likely to avoid turbines despite relatively high numbers of sandhill cranes observed within and surrounding wind facilities (Nagy et al. 2012; Pearse et al. 2016).

- Ferruginous hawk: The exposure index for ferruginous hawks is approximately 1.3 times greater for the GE 3.03-MW turbine (Option 1) than for the other three turbine technologies (Table 2). AUS indicated very low mean use of the Project area by ferruginous hawks; however, breeding has been observed within 2 miles of the Lease Boundary. Because Option 1 also requires a larger number of turbines, it is expected that this option would result in greater collision risk for ferruginous hawks.

- Bald eagle *(Haliaeetus leucocephalus)*: The exposure index for bald eagles is approximately 1.1 to 1.3 times greater for Option 2 technologies than Option 1 technologies (Table 2). It is uncertain if the smaller exposure indices for Option 1 technologies would offset the larger number of turbines required.

- Golden eagle: The exposure index for golden eagles for Option 1 technologies is approximately 1.2 times greater than the GE 5.5-MW turbine (Option 2), but the same as for the SG 6.0-MW turbine (Option 2) (Table 2). Because Option 1 would also require a greater number of turbines than Option 2, it is expected to result in greater collision risk for golden eagles.
- Great blue heron *(Ardea herodias)*: Exposure indices are less than 0.001 for all turbine technologies (Table 2); therefore, the option requiring more turbines (Option 1) is expected to result in greater collision risk for great blue herons.
- Prairie falcon *(Falco mexicanus)*: Exposure indices for prairie falcons are 1.2 to 3.3 times greater for Option 1 technologies than Option 2 technologies (Table 2). Because Option 1 would also require a greater number of turbines than Option 2, it is expected to result in greater collision risk for prairie falcons.
- Tundra swan *(Cygnus columbianus)*: Exposure indices for tundra swans are 0.011 for the GE 3.03-MW turbine (Option 1) and zero at all other turbine technologies (Table 2). Because Option 1 would also require a greater number of turbines than Option 2, it is expected to result in greater collision risk for tundra swans.

Of the eight special status bird species for which exposure indices are available, exposure indices are highest for Option 1 technologies for four species (ferruginous hawk, golden eagle, prairie falcon, and tundra swan) and similar across all technologies for two species (American white pelican and great blue heron). Option 1 is expected to result in greater collision risk for these six special status species based on the combination of higher exposure indices and greater number of turbines than Option 2. Exposure indices are highest for Option 2 technologies for two special status bird species (sandhill crane and bald eagle), but it is uncertain to what degree this may be offset by fewer turbines. When interpreting these conclusions, it should be noted that exposure indices do not consider species-specific collision avoidance behavior around wind turbines.

Table 2: Exposure Indices for Special Status Bird Species

Common Name	Overall Mean Use[1]	Exposure Index			
		Option 1 (GE 2.82 MW Turbine)	Option 1 (GE 3.03 MW Turbine)	Option 2 (GE 5.5 MW Turbine)	Option 2 (SG 6.0 MW Turbine)
American white pelican	0.35	0.289	0.290	0.303	0.303
Sandhill crane	1.60	0.042	0.042	0.332	0.332
Bald eagle	0.02	0.009	0.011	0.012	0.012
Tundra swan	0.01	0	0.011	0	0
Prairie falcon	0.02	0.007	0.010	0.003	0.006
Golden eagle	0.01	0.007	0.007	0.006	0.007
Ferruginous hawk	0.01	0.003	0.004	0.003	0.003
Great blue heron	<0.01	<0.001	<0.001	<0.001	<0.001

[1] Overall mean use is the average number of observed individuals per survey plot.

GE = General Electric; MW = megawatts; SG = Siemens Gamesa

3.1.2 Literature Review

The effect of turbine height and rotor swept area on bird collision mortalities remains uncertain (AWWI 2021). It is possible that local factors at wind farms (e.g., bird abundance, species composition, topography, habitat, spatial arrangement of turbines) can lead to strong variation in bird mortality rates that confound possible effects of turbine size (Marques et al. 2014; Everaert 2014). Turbine size has been suggested as an important factor for collision risk because higher turbines may extend into the airspace traveled by migrating birds and higher turbines typically have a larger rotor swept zone and consequently a larger collision risk area. However, the relationship between turbine heights and bird mortality rates is not consistent among studies.

Some studies report higher bird mortality rates per turbine at taller turbines. Bird collision mortality modeled by Loss et al. (2013) predicted that mortality rates would increase nearly tenfold from 0.64 to 6.20 birds per turbine across the range of turbine heights included in their study, which was 118 to 262 feet (36 to 80 m). De Lucas et al. (2008) found a positive relationship between turbine height and mortality rate of raptors (i.e., more fatalities at taller turbines) at two wind farms in Spain where turbine heights ranged from 59 to 118 feet (18 to 36 m). A similar positive relationship was observed at Altamont Pass, California, where the number of bird mortalities at turbines with larger rotor diameters and rotors 79 feet (24 m) above ground was more than expected based on the number of turbines alone (Thelander et al. 2003). Thaxter et al. (2017) noted that bird mortality rates increased with larger turbine capacity (megawatts).

Other studies did not find a relationship between bird mortality rates and turbine height. Bird mortality rate and collision risk were not significantly related to turbine size at eight wind farms in Belgium, where turbine characteristics ranged from 75 to 322 feet (23 to 98 m) hub height and 112 to 456 feet (34 to 139 m) maximum total height (i.e., blade tip) (Everaert 2014). Barclay et al. (2007) compiled wind turbine and bird and bat mortality data from 33 wind farms in North America to assess the influence of turbine characteristics on collision risk. Turbine characteristics varied among sites, with rotor diameters ranging from 59 to 295 feet (18 to 90 m) and turbine hub heights ranging from 78 to 308 feet (24 to 94 m). They found that turbine height and rotor diameter did not influence bird mortality rate. The authors suggested that because a significant proportion of bird mortalities at wind farms occur during the day, the ability of birds to detect and avoid turbines may not vary with turbine size (Barclay et al. 2007). Krijgsveld et al. (2009) found that bird collision risk with larger multi-MW turbines (hub height 220 to 256 feet [67 to 78 m]; rotor diameter 217 feet [66 m]) was similar to earlier generation turbines and suggested that the increased altitude of turbine blades may allow more local birds (i.e., birds not undertaking migratory flight) to pass underneath the rotor area, while greater spacing between larger turbines may allow birds to pass between turbines. Further, mortality rates could also be related to rotation speed of the rotors (Krigjsveld et al. 2009). Large rotors rotate at lower speeds than small ones, which reduces the probability that birds flying through the rotor swept area will be hit (Orfloff and Flannery 1996). Tucker (1996) demonstrated mathematically that collision risk is higher closer to the hub than at the rotor tip and does not increase linearly with the surface area of the rotor swept zone.

Bird mortality rates may be lower at taller turbines per unit of energy generation, however results are not unequivocal. Although Thaxter et al. (2017) noted a strong positive relationship between wind turbine capacity (i.e., MW) and bird collision rate per turbine, the strength of this relationship was offset by the reduced number of turbines required per unit of energy generation. A greater number of small turbines resulted in higher predicted bird mortality rates than a smaller number of large turbines per unit energy output (Thaxter et al. 2017). Thaxter et al. (2017) concluded that wind farm generation capacity should be met by deploying fewer large turbines, rather than many smaller ones. However, they modeled turbines with a capacity range of 0.1 to 2.5 MW, which is lower than those considered for the Horse Heaven Wind Farm, and the number of estimated bird mortalities decreased exponentially up to 1.2 MW, but only slightly thereafter to 2.5 MW (Thaxter et al. 2017). Further, such results are not unequivocal. Huso et al. (2021) found that bird mortality rate was constant per unit of energy produced, a metric that accounts for turbine operating time, across all sizes and spacing of turbines at a repowered wind farm in California.

Replacing several small turbines with fewer larger turbines (i.e., repowering) has been hypothesized to reduce bird collision risk, particularly for raptors (Arnett and May 2016; Dahl et al. 2015; Thaxter et al. 2017). For example, repowering of the 20.5 MW Diablo Winds Energy Project in California from 105 150-kilowatt (kW) and 25 250-kW turbines to 38 of the larger 660-kW turbines decreased raptor mortalities per MW per year by 54% (Smallwood et al. 2009). When a wind farm in Sweden was repowered from 58 to 28 turbines that produced four times the amount of energy, the number of bird mortalities per turbine per year was 1.77 times greater, but this was offset by the reduced number of turbines and the total bird mortalities decreased by 19%, while the bird mortality rate per MW decreased by 80% (Hjernquist 2014 as cited in Dahl et al. 2015). Dahl et al. (2015) predicted a reduction in collision risk of 29% and 68% for white-tailed eagles at a wind farm in Norway if 68 2-MW turbines were repowered to 50 3-MW or 30 5-MW turbines, respectively. The reduced risk was attributed to fewer turbines and better individual siting (Dahl et al. 2015).

In summary, there is conflicting research regarding whether turbine size influences bird mortality rates, but the weight of evidence suggests that per unit of energy output, a wind farm layout with fewer larger turbines (i.e., Option 2) may have fewer total bird mortalities than one with a greater number of smaller turbines (i.e., Option 1). Some studies report no significant relationship between bird mortality rates and turbine size (Everaert 2014; Barclay et al. 2007; Krijsveld et al. 2009), while others report higher mortality rates with larger turbines (Loss et al. 2013; Dahl et al. 2015; De Lucas et al. 2008; Thelander et al. 2003; Thaxter et al. 2017). Even with a positive relationship between turbine size and mortality rates, it appears that the increased number of mortalities per turbine may be offset by fewer mortalities as a result of fewer turbines (e.g., Thaxter et al. 2017; Hjernquist 2014 as cited in Dahl et al. 2015).

There are several important limitations and sources of uncertainty related to this conclusion. Existing available information is derived from studies at wind farms with shorter turbines than those considered for the Project under either option. Notably, none of the studies reviewed during this literature review included turbines as tall as those considered under Option 2 (i.e., 410 feet [125 m] hub height). It is possible that a different relationship between turbine height and bird mortality rate may exist at turbine heights beyond the range considered in published literature. Additionally, relatively few studies have been completed at repowered wind farms; those that have been completed examined changes in bird mortality rates from replacing smaller old-generation turbines with fewer, larger, newer turbines (e.g., Smallwood et al. 2010). It is uncertain if similar differences in bird mortality rates would exist between two wind farm layouts with substantially larger turbines such as those considered under the two options for the Project. Finally, measuring impacts of repowering can be confounded by variability in space, time, and operational constraints (Huso et al. 2021), making it difficult to extrapolate results from one wind farm to another.

3.2 Bats

3.2.1 Acoustic Bat Surveys

The average number of bat passes per night recorded during acoustic bat surveys ranged from 0.27 to 1.12 among the study areas and survey years for which bat surveys were conducted for the Project (Table 3). Eight bat species were documented during acoustic bat surveys in and around the Lease Boundary (Table 3). No federal or state-listed bat species were detected. Most recorded bat passes were produced by three low-frequency bat species: silver-haired bat *(Lasionycteris noctivagans)*, hoary bat *(Lasiurus cinereus)*, and big brown bat *(Eptesicus fuscus)* (Table 4). The documented period of peak bat activity in and around the Lease Boundary occurred during September at all stations.

Table 3: Summary of Acoustic Bat Survey Results

Survey Year / Type	Horse Heaven West 2017	Horse Heaven West 2018	Horse Heaven West 2018[(a)]	Horse Heaven East 2018[(b)]
Survey Dates	19 Aug–30 Oct	14 May–29 Oct	14 May–29 Oct	11 May–29 Oct
No. of Stations	1	1	1	2
No. of Detectors	1	2	2	4
Detector Nights	72	303	344	670
Total Bat Passes	24	82	384	734
Number of High-Frequency (>30 kHz) Bat Passes	2	1	24	55
Number of Low-Frequency (<30 kHz) Bat Passes	22	81	360	679
Average Number of Bat Passes per Night	0.33 ± 0.08	0.27 ± 0.05	1.12 ± 0.13	1.09 ± 0.11

[(a)] Formerly Badger Canyon Wind Project

[(b)] Formerly Four Mile Wind Project

Source: Table 3.4-6 of the Application for Site Certification (Horse Heaven Wind Farm, LLC 2021)

Table 4: Bat Species Present by Study Phase

Common Name	Scientific Name	Number of Nights Present (Percentage of Nights Present)		
		Horse Heaven West 2017 & 2018	Horse Heaven West 2018[(a)]	Horse Heaven East 2018[(b)]
High-Frequency Group (>30 kHz)				
California bat	*Myotis californicus*	0 (0%)	0 (0%)	1 (<1%)
Canyon bat	*Parastrellus hesperus*	3 (<1%)	9 (3%)	11 (2%)
Little brown bat	*Myotis lucifugus*	0 (0%)	2 (1%)	8 (1%)
Long-legged bat	*Myotis volans*	0 (0%)	0 (0%)	2 (<1%)
Western long-eared bat	*Myotis evotis*	0 (0%)	0 (0%)	1 (<1%)

Common Name	Scientific Name	Number of Nights Present (Percentage of Nights Present)		
		Horse Heaven West 2017 & 2018	Horse Heaven West 2018[(a)]	Horse Heaven East 2018[(b)]
Low-Frequency Group (<30 kHz)				
Big brown bat	*Eptesicus fuscus*	8 (2%)	19 (6%)	31 (5%)
Hoary bat	*Lasiurus cinereus*	13 (3%)	47 (14%)	91 (14%)
Silver-haired bat	*Lasionycteris noctivagans*	55 (15%)	81 (24%)	169 (25%)
Total Number of Detector Nights		**375**	**344**	**670**

[(a)] Formerly Badger Canyon Wind Project

[(b)] Formerly Four Mile Wind Project

Source: Table 3.4-7 of the Application for Site Certification (Horse Heaven Wind Farm, LLC 2021)

kHz = kilohertz

3.2.2 Literature Review

Collision with turbines is considered one of the greatest threats to bats in North America (O'Shea et al. 2016). Post-construction monitoring studies at wind farms show that migratory tree-roosting bat species (e.g., eastern red bat *[Lasiurus borealis]*, hoary bat, and silver-haired bat) compose approximately 72% of reported bat fatalities and occur mostly during fall migration (August to September) (AWWI 2018). Based on data from 52 wind farms in Washington, hoary and silver-haired bats made up 52% and 44% of reported bat mortalities (WEST 2019). In Washington, mortality estimates from 13 wind farms had a median adjusted mortality rate of 1.4 bats/MW/year (range 0.4 to 2.5 bats per MW per year) (WEST 2019). The bat fatality rate at the nearby Nine Canyon Wind Project was 2.47 bats per MW per year and consisted entirely of hoary and silver-haired bats (Horse Heaven Wind Farm, LLC 2021). The ASC predicted that bat mortalities during operation of the Project (Horse Heaven Wind Farm, LLC 2021) would:

- be within the range of other facilities in Washington
- consist primarily of migratory, tree-roosting species (e.g., silver-haired bat, hoary bat)
- occur mainly in the fall

Considering that only three species make up most bat mortalities resulting from turbine collision, population-level impacts to these species may become an issue as the number of wind farms increases (Barclay et al. 2007; Zimmerling and Francis 2016; Hein and Schirmacher 2016). Demographic modeling suggests that mortality from wind turbines may drastically reduce population size of the hoary bat and increase its risk of extinction (Frick et al. 2017). The qualitative conclusions are likely broadly informative about the relative risk to other migratory bat species that share similar life histories and high fatality rates at wind turbines, such as silver-haired bat (Frick et al. 2017). The potential for population-level consequences for some bat species from wind farm development across North America highlights the importance of considering them as priority species for mitigation measures. However, the effect of turbine height and rotor swept area on bat collision mortalities remains uncertain (AWWI 2021).

Some studies report that bat mortality rates increase with turbine size (Baerwald and Barclay 2009), including on a per MW basis (Barclay et al. 2007). A study conducted at nine wind farms in southern Alberta, where turbine heights ranged from 164 to 276 feet (50 to 84 m), found that bat mortality rates increase with turbine height (Baerwald and Barclay 2009). That study also found that the interaction between migratory bat activity at 98 feet (30 m) above ground level and turbine height was an important predictor of bat mortality rates (Baerwald and Barclay 2009). Modeling predicted that sites with high activity but relatively short turbines had low mortality rates, as did sites with low activity but tall turbines. At sites with little migratory bat activity, mortality rates were predicted to be low regardless of turbine height. However, at sites with high bat activity, an increase in turbine height also increases the mortality rate (Baerwald and Barclay 2009). Barclay et al. (2007) compiled wind turbine and bat mortality data from 33 wind farms in North America to assess the influence of turbine characteristics on collision risk. Turbine characteristics varied across sites, with rotor diameters ranging from 59 to 295 feet (18 to 90 m) and turbine hub height ranging from 78 to 308 feet (24 to 94 m). They found that rotor diameter did not influence bat mortality rate, but turbine (i.e., hub) height did. Fatality rates of bats were relatively low at short turbines (< 213 feet [65 m] high) but increased exponentially with turbine height. The highest bat fatality rates occurred at turbines with towers 213 feet (65 m) or taller and increased with MW capacity per turbine (Barclay et al. 2007). Barclay et al. (2007) concluded that replacing several small turbines (each with low power output) with one large one (with higher power output) may help reduce bird fatalities but is likely to increase the number of bats killed per megawatt of installed capacity. They also suggested that taller turbines reach the airspace used by migrating bats and that minimizing turbine height may help minimize bat fatalities (Barclay et al. 2007). Radar studies indicate that nocturnal migrants fly at heights ranging from <328 feet (100 m) to >0.61 miles (1 kilometer) (Barclay et al. 2007), noting that radar cannot distinguish between bats and birds.

Some studies report lower bat mortality rates at taller turbines on a per MW basis (Fielder et al. 2007) or suggest that bat mortality rates increase on either side of an optimum intermediate turbine size (Thaxter et al. 2017). Although bat mortality estimates at a wind farm in Tennessee were greater on a per turbine basis at larger 1.8-MW turbines (V80 turbine with a height of 256 feet [78 m] and rotor diameter of 276 feet [84 m]) than at smaller 0.66-MW turbines (V47 turbine with a height of 213 feet [65 m] and rotor diameter of 151 feet [46 m]), when mortality was measured per MW, the smaller V47 turbines had a greater mortality rate (53.3 bats/MW/year) than the larger V80 turbines (38.7 bats per MW per year) (Fiedler et al. 2007). Thaxter et al. (2017) suggest that for bats, an optimum turbine size of approximately 1.25 MW may minimize collision risk. Their models indicated that per unit of energy output at a hypothetical 10-MW wind farm, using one thousand 0.01-MW turbines resulted in the largest estimated number of bat mortalities. Thereafter, the numbers decreased exponentially up to approximately 1.2 MW, but then increased again from 14 bats with 1.2-MW turbines, to 24 bats with 2.5-MW turbines. However, the authors cautioned that model certainty was low and more research was required to understand the relationship between collision risk and turbine size for larger turbines (Thaxter et al. 2017).

Overall, the relationship between turbine height and bat collision mortalities is too inconclusive to make confident predictions regarding which turbine option is expected to result in fewer bat mortalities. There is limited and conflicting information about the effect of turbine height on bat collision mortalities. Some studies report that bat mortality rates increase with turbine size (Baerwald and Barclay 2009), including on a per MW basis (Barclay et al. 2007), while others report no effect (Huso et al. 2021), the opposite effect (Fielder et al. 2007), or that mortality rates increase on either side of an optimum intermediate turbine size (Thaxter et al. 2017). Extrapolating results from these studies to the Horse Heaven Wind Farm is further limited by the range of turbine heights analyzed, which are shorter than those under consideration for the Project under either option. It is possible that a different relationship between turbine height and bat mortality rate may exist at turbine heights beyond the range considered in available published literature.

4.0 CONCLUSION

This special study report contains supplemental information regarding potential bird and bat collision risk between the two turbine options considered for the Project for use in the Energy Facility Site Evaluation Council's evaluation of impacts within the Environmental Impact Statement. The following provides a summary of anticipated wildlife collision risk associated with the two turbine options based on information collected during baseline studies and a review of available published scientific literature:

- Based on AUS data:
  - Mean exposure indices for small bird species were highest at the GE 3.03-MW turbines (Option 1) and similar across the three other turbine technologies. Therefore, Option 1 is expected to result in a greater number of small bird mortalities.
  - Among large bird species, exposure indices for raptors were higher for shorter turbines (Option 1), but exposure indices for waterfowl were higher at taller turbines (Option 2). It is expected that the option requiring a greater number of shorter turbines (Option 1) would result in more large bird mortalities because raptors appear more susceptible to turbine collisions than waterfowl (AWWI 2021).
  - Option 1 is expected to result in greater collision risk for six of the eight special status bird species observed during AUS (ferruginous hawk, golden eagle, prairie falcon, tundra swan, American white pelican, great blue heron). Exposure indices were highest for Option 2 technologies for two special status bird species (sandhill crane, bald eagle), but it is uncertain to what degree this may be offset by fewer turbines.
- Based on a literature review, the weight of evidence suggests that per unit of energy output, a wind farm layout with fewer larger turbines (i.e., Option 2) is likely to have fewer total bird mortalities than one with a greater number of smaller turbines (i.e., Option 1).
- The relationship between turbine height and bat collision mortalities is too inconclusive to make confident predictions regarding which turbine option is expected to result in fewer bat mortalities.

The mortality risk for different taxa should be weighed against the potential for population-level impacts. For example, collisions with turbines do not appear likely to lead to population-level impacts for small passerine (i.e., songbird) species (AWWI 2021), but may have population-level impacts for some diurnal raptor species based on future wind energy projections (Diffendorfer et al. 2021). Considering that only three bat species (hoary, silver-haired, and eastern red bat) make up most bat mortalities at turbines, population-level impacts may become an issue as the number of wind farms increase (Barclay et al. 2007; Hein and Schirmacher 2016; Zimmerling and Francis 2016; Frick et al. 2017).

It is important to acknowledge that there is uncertainty associated with these conclusions related to conflicting results in available published scientific studies, lack of studies at turbines within the range of heights considered for the Horse Heaven Wind Farm, and potential for substantial variability in wildlife mortality based on local factors (e.g., bird abundance, species composition, topography, habitat, spatial arrangement of turbines). These sources of uncertainty limit the confidence of predicted wildlife mortality risk associated with the two turbine options.

5.0 CLOSURE

We trust that the information contained in this report is sufficient for your present needs. Should you have any questions regarding the Project or this report, please do not hesitate to contact the undersigned.

The material in this report reflects Golder's best judgment based on information available at the time of preparation and has been produced in a manner consistent with the level of care and skill normally exercised by environmental professionals currently practicing under similar conditions in the jurisdiction in which the services are provided. If the report is edited, revised, altered, or added to in any way, all references to Golder and Golder's employees must be removed unless changes are agreed to by Golder. Any use which a third party makes of this report or any reliance on or decisions to be made based on it are the responsibility of such third party. Golder accepts no responsibility for damages, if any, suffered by any third party as a result of decision made or action based on this report.

Golder Associates Ltd.

Ilya Povalyaev, RPBio
Wildlife Biologist

Kate Moss, RPBio
Senior Biologist

Don Gamble, RPP, MCIP, RPBio
Principal, Senior Environmental Planner

6.0 REFERENCES

AWWI (American Wind Wildlife Institute). 2018. AWWI technical report: A summary of bat fatality data in a nationwide database. Washington, DC. 41 pp.

AWWI. 2021. Wind energy interactions with wildlife and their habitats. A summary of research results and priority questions. Washington, DC. 12 pp.

Arnett EB, May RF. 2016. Mitigating wind energy impacts on wildlife: approaches for multiple taxa. Human-Wildlife Interactions, 10(1):28-41.

Baerwald EF, Barclay RMR. 2009. Geographic variation in activity and fatality of migratory bats at wind energy facilities. Journal of Mammalogy, 90(6):1341-1349.

Barclay RMR, Baerwald EF, Gruver JC. 2007. Variation in bat and bird fatalities at wind energy facilities: assessing the effects of rotor size and tower height. Canadian Journal of Zoology 85, 381–387.

Dahl EL, May R, Nygard T, Astrøm J, Diserud OH. 2015. Repowering Smøla wind-power plant. An assessment of avian conflicts. Norwegian Institute for Nature Research (NINA) Report 1135. 41 pp.

De Lucas M, Janss GFE, Whitfield DP, Ferrer M. 2008. Collision fatality of raptors in wind farms does not depend on raptor abundance. Journal of Applied Ecology 45:1695–1703.

Diffendorfer JE, Stanton JC, Beston JA, Thogmartin WE, Loss SR, Katzner TE, Johnson DH, Erickson RA, Merrill MD, Corum MD. 2021. Demographic and potential biological removal models identify raptor species sensitive to current and future wind energy. Ecosphere, 12(6): e03531.10.1002/ecs2.3531.

Erickson WP, Wolfe MM, Bay KJ, Johnson DH, Gehring JL. 2014. A comprehensive analysis of small-passerine fatalities from collision with turbines at wind energy facilities. PLoS ONE 9(9): e107491. https://doi.org/10.1371/journal.pone.0107491.

Everaert J. 2014. Collision risk and micro-avoidance rates of birds with wind turbines in Flanders. Bird Study 61: 220-230.

Fiedler JK, Henry TH, Nicholson CP, Tankersley RD. 2007. Results of bat and bird mortality monitoring at the expanded Buffalo Mountain Windfarm, 2005. Tennessee Valley Authority, Knoxville, Tennessee, USA.

Frick WF, Baerwald EF, Pollock JF, Barclay RMR, Szymanski JA, Weller TJ, Russell AL, Loeb SC, Medellin RA, McGuire LP. 2017. Fatalities at wind turbines may threaten population viability of a migratory bat. Biological Conservation 209:172–177.

Guest EE, Stamps BF, Durish ND, Hale AM, Hein CD, Morton BP, Weaver SP, Fritts SR. 2022. An Updated Review of Hypotheses Regarding Bat Attraction to Wind Turbines. Animals, 12:343. https://doi.org/10.3390/ani12030343.

Hein C, Gruver J, Arnett E. 2013. Relating pre-construction bat activity and post-construction bat fatality to Predict risk at wind energy facilities: A synthesis. Prepared for the National Renewable Energy Laboratory. 21 pp.

Hein C, Schirmacher M. 2016. Impact of wind energy on bats: A summary of our current knowledge. Human – Wildlife Interactions 10(1):19–27.

Hjernquist MB. 2014. Effekter på fågellivet vid ett generationsskifte av vindkraftverk – kontrollprogram, Nasudden, Golatnd 2009 – 2013. Karl Mårten Hjernquist Konsult, Havdhem.

Horse Heaven Wind Farm, LLC. 2021. Horse Heaven Wind Farm - Application for Site Certificate. EFSEC Docket Number: EF-210011. Submitted to: Washington Energy Facility Site Evaluation Council, Olympia, WA. Submitted by Horse Heaven Wind Farm, LLC., Boulder, CO. 526 pp. + appendices.

Huso M, Conkling T, Dalthorp D, Davis M, Smith H, Fesnock A, Katzner T. 2021. Relative energy production determines effect of repowering on wildlife mortality at wind energy facilities. Journal of Applied Ecology 58:1284–1290.

Krijgsveld KL, Akershoek K, Schenk F, Dijk F, Dirksen S. 2009. Collision risk of birds with modern large wind turbines. Ardea 97(3):357–366.

Loss SR, Will T, Marra PP. 2013. Estimates of bird collision mortality at wind facilities in the contiguous United States. Biological Conservation. 168:201-209.

Marques AT, Batalha H, Rodrigues S, Costa H, Pereira MJR, Fonseca C, Mascarenhas M, Bernardino J. 2014. Understanding bird collisions at wind farms: An updated review on the cause and possible mitigation strategies. Biological Conservation 179:40–52.

Nagy L, Gibson B, Kosciuch K, Taylor J, Gunderman B. 2012. Whooping crane and sandhill crane behaviour at an operating wind farm. Poster presentation. National Wind Coordinating Collaborative. Wind Wildlife Research Meeting IX. Broomfield, Colorado. November 28–30, 2012.

O'Shea TJ, Cryan PM, Hayman DTS, Plowright RK, Streicker DG. 2016. Multiple mortality events in bats: A global review. Mammal Review 46(3):175–190.

Orloff S, Flannery A. 1996. A continued examination of avian mortality in the Altamont Pass Wind Resource Area. California Energy Commission, USA.

Pearse AT, Brandt DA, Krapu GL. 2016. Wintering sandhill crane exposure to wind energy development in the central and southern Great Plains, USA. The Condor 118:391–401.

Solick D, Pham D, Nasman K, Bay K. 2020. Bat activity rates do not predict bat fatality rates at wind energy facilities. Acta Chiropterologica 22(1):135–146.

Smallwood KS, Neher L, Bell DA. 2009. Map-based repowering and reorganization of a wind resource area to minimize burrowing owl and other bird fatalities. Energies 2:915–943.

Smallwood KS, Bell DA, Snyder SA, DiDonato JE. 2010. Novel scavenger removal trials increase wind turbine-caused avian fatality estimates. Journal of Wildlife Management 74:1089–1096.

Thaxter CB, Buchanan GM, Carr J, Butchart SHM, Newbold T, Green RE, Tobias JA, Foden WB, O'Brien S, Pearce-Higgins JW. 2017. Bird and bat species' global vulnerability to collision mortality at wind farms revealed through a trait-based assessment. Proceedings of the Royal Society of Britain 284:20170829. http://dx.doi.org/10.1098/rspb.2017.0829.

Thelander CG, Smallwood KS, Rugge L. 2003. Bird risk behaviors and fatalities at the Altamont Pass Wind Resource Area. National Renewable Energy Laboratory. Golden, CO., USA. 86 pp.

Tucker VA. 1996. A mathematical model of bird collisions with wind turbine rotors. Journal of Solar Energy Engineering 118:253–262.

Watson RT, Kolar PS, Ferrer M, Nygard T, Johnston N, Hunt WG, Smit-Robinson H, Farmer CJ, Huso M, Katzner TE. 2018. Raptor interactions with wind energy: case studies from around the world. Journal of Raptor Research 52(1):1–18.

WEST (Western EcoSystems Technology Inc.). 2019. Regional summaries of wildlife fatalities at wind facilities in the United States. 2019 Report from the Renew Database. Published by WEST, Inc., Cheyenne, Wyoming. Available at: https://west-inc.com/news-insights/publications/.

Zimmerling JR, Francis CM. 2016. Bat mortality due to wind turbines in Canada. Wildlife Management, 80(8):1360-1369.

.

APPENDIX A

Species-specific Exposure Indices from Avian Use Studies

Table A-1: Exposure Indices Calculated for Small Bird Species Observed During Avian Use Studies, 2017-2020

Common Name	Overall Mean Use	Percentage Flying	Option 1				Option 2			
			GE 2.82 MW Turbine (25 to 155 m RSH)		GE 3.03 MW Turbine (10 to 155 m RSH)		GE 5.5 MW Turbine (45 to 205 m RSH)		SG 6.0 MW Turbine (30 to 200 m RSH)	
			Percentage Flying within RSH	Exposure Index	Percentage Flying within RSH	Exposure Index	Percentage Flying within RSH	Exposure Index	Percentage Flying within RSH	Exposure Index
Horned lark	5.30	69.0	8.5	0.312	34.9	1.275	0	0	5.1	0.187
Unidentified small bird	0.15	96.1	21.6	0.032	95.9	0.149	21.6	0.032	21.6	0.032
Bank swallow	0.14	100.0	0	0	50.0	0.072	0	0	0	0
White-crowned sparrow	0.14	70.0	0	0	62.5	0.063	0	0	0	0
European starling	0.10	69.6	79.8	0.057	81.9	0.059	2.1	0.002	78.7	0.057
Barn swallow	0.09	100.0	10.3	0.010	41.4	0.039	0	0	10.3	0.010
Brewer's blackbird	0.03	100.0	0	0	50.0	0.014	0	0	0	0
Western meadowlark	0.28	31.8	0	0	11.7	0.011	0	0	0	0
Western kingbird	0.03	31.3	20.0	0.002	80.0	0.008	0	0	20.0	0.002
Unidentified swallow	0.02	100.0	0	0	28.6	0.007	0	0	0	0
Savannah sparrow	0.06	76.9	0	0	12.0	0.006	0	0	0	0
Cliff swallow	0.04	100.0	0	0	10.0	0.004	0	0	0	0
American goldfinch	0.02	14.9	71.4	0.002	71.4	0.002	0	0	0	0
Red-winged blackbird	<0.01	100.0	66.7	0.001	100.0	0.002	0	0	66.7	0.001

Common Name	Overall Mean Use	Percentage Flying	Option 1				Option 2			
			GE 2.82 MW Turbine (25 to 155 m RSH)		GE 3.03 MW Turbine (10 to 155 m RSH)		GE 5.5 MW Turbine (45 to 205 m RSH)		SG 6.0 MW Turbine (30 to 200 m RSH)	
			Percentage Flying within RSH	Exposure Index	Percentage Flying within RSH	Exposure Index	Percentage Flying within RSH	Exposure Index	Percentage Flying within RSH	Exposure Index
American pipit	<0.01	50.0	50.0	0.001	50.0	0.001	0	0	0	0
Vesper sparrow	<0.01	85.7	16.7	0.001	16.7	0.001	0	0	0	0
American robin	<0.01	100.0	0	0	0	0	0	0	0	0
Chipping sparrow	<0.01	50.0	0	0	0	0	0	0	0	0
Golden-crowned sparrow	<0.01	100.0	0	0	0	0	0	0	0	0
Grasshopper sparrow	0.02	16.7	0	0	0	0	0	0	0	0
House finch	0.01	100.0	0	0	0	0	0	0	0	0
Lark sparrow	0.01	50.0	0	0	0	0	0	0	0	0
Northern flicker	0.01	25.0	0	0	0	0	0	0	0	0
Say's phoebe	<0.01	100.0	0	0	0	0	0	0	0	0
Song sparrow	0.01	100.0	0	0	0	0	0	0	0	0
Unidentified passerine	<0.01	100.0	0	0	0	0	0	0	0	0
Unidentified sparrow	<0.01	50.0	0	0	0	0	0	0	0	0

Source: Table 3.4-9 of the ASC (Horse Heaven Wind Farm, LLC 2021).

MW = megawatt; RSH = rotor swept height

Table A-2: Exposure Indices Calculated for Large Bird Species Observed during Avian Use Studies, 2017–2020

Common Name	Overall Mean Use	Percentage Flying	Option 1				Option 2			
			GE 2.82 MW Turbine (25 to 155 m RSH)		GE 3.03 MW Turbine (10 to 155 m RSH)		GE 5.5 MW Turbine (45 to 205 m RSH)		SG 6.0 MW Turbine (30 to 200 m RSH)	
			Percentage Flying within RSH	Exposure Index	Percentage Flying within RSH	Exposure Index	Percentage Flying within RSH	Exposure Index	Percent Flying within RSH	Exposure Index
Corvids										
American crow	<0.01	100.0	0	0	0	0	0	0	0	0
Black-billed magpie	0.02	93.3	10.7	0.002	21.4	0.004	0	0	10.7	0.002
Common raven	1.54	93.8	53.2	0.77	82.2	1.19	25.1	0.363	47.2	0.684
Diurnal Raptors										
American kestrel	0.18	52.6	22.1	0.021	72.6	0.07	4.4	0.004	15.0	0.014
Bald eagle	**0.02**	**100.0**	**60.0**	**0.009**	**73.3**	**0.011**	**80.0**	**0.012**	**80.0**	**0.012**
Cooper's hawk	0.01	100.0	66.7	0.007	66.7	0.007	33.3	0.003	66.7	0.007
Ferruginous hawk	**0.01**	**100.0**	**50.0**	**0.003**	**75.0**	**0.004**	**50.0**	**0.003**	**50.0**	**0.003**
Golden eagle	**0.01**	**85.7**	**100.0**	**0.007**	**100.0**	**0.007**	**83.3**	**0.006**	**100.0**	**0.007**
Merlin	<0.01	100.0	0	0	0	0	0	0	0	0
Northern harrier	0.56	98.4	10.6	0.058	24.7	0.136	5.9	0.032	8.9	0.049
Osprey	<0.01	100.0	100.0	0.002	100.0	0.002	100.0	0.002	100.0	0.002
Prairie falcon	**0.02**	**57.6**	**63.2**	**0.007**	**89.5**	**0.01**	**26.3**	**0.003**	**52.6**	**0.006**
Red-tailed hawk	0.32	78.7	75.7	0.188	91.7	0.228	60.3	0.15	72.6	0.181

Common Name	Overall Mean Use	Percentage Flying	Option 1				Option 2			
			GE 2.82 MW Turbine (25 to 155 m RSH)		GE 3.03 MW Turbine (10 to 155 m RSH)		GE 5.5 MW Turbine (45 to 205 m RSH)		SG 6.0 MW Turbine (30 to 200 m RSH)	
			Percentage Flying within RSH	Exposure Index	Percentage Flying within RSH	Exposure Index	Percentage Flying within RSH	Exposure Index	Percent Flying within RSH	Exposure Index
Rough-legged hawk	0.26	88.7	75.9	0.172	93.8	0.213	49.5	0.112	71.0	0.161
Sharp-shinned hawk	0.01	100.0	42.9	0.002	71.4	0.004	28.6	0.002	42.9	0.002
Swainson's hawk	0.24	83.4	83.7	0.164	97.2	0.19	62.6	0.123	79.3	0.155
Unidentified accipiter	<0.01	100.0	75.0	0.003	75.0	0.003	75.0	0.003	100.0	0.003
Unidentified buteo	0.03	75.0	70.0	0.013	70.0	0.013	63.3	0.012	73.3	0.014
Unidentified falcon	0.01	70.0	28.6	0.001	42.9	0.002	14.3	0.001	14.3	0.001
Unidentified raptor	0.02	100.0	54.5	0.009	90.9	0.015	36.4	0.006	63.3	0.011
Doves/Pigeons										
Mourning dove	0.01	65.4	0	0	52.9	0.005	0	0	0	0
Rock pigeon	1.01	80.2	47.8	0.388	78.2	0.634	8.8	0.071	37.5	0.304
Gulls/Terns										
California gull	0.23	100.0	70.2	0.159	91.1	0.206	28.6	0.065	78.0	0.176
Ring-billed gull	0.02	100.0	30.8	0.005	30.8	0.005	3.8	0.001	28.8	0.005
Unidentified gull	0.09	100.0	94.2	0.087	97.1	0.09	89.4	0.082	93.3	0.086

Common Name	Overall Mean Use	Percentage Flying	Option 1				Option 2			
			GE 2.82 MW Turbine (25 to 155 m RSH)		GE 3.03 MW Turbine (10 to 155 m RSH)		GE 5.5 MW Turbine (45 to 205 m RSH)		SG 6.0 MW Turbine (30 to 200 m RSH)	
			Percentage Flying within RSH	Exposure Index	Percentage Flying within RSH	Exposure Index	Percentage Flying within RSH	Exposure Index	Percent Flying within RSH	Exposure Index
Owls										
Short-eared owl	<0.01	66.7	0	0	0	0	0	0	0	0
Shorebirds										
Killdeer	0.01	96.0	16.7	0.001	83.3	0.007	0	0	0	0
Long-billed curlew	0.01	60.0	16.7	0.001	100.0	0.003	0	0	16.7	0.001
Upland Game Birds										
California quail	0.01	13.3	0	0	0	0	0	0	0	0
Gray partridge	0.01	11.1	0	0	0	0	0	0	0	0
Vultures										
Turkey vulture	0.01	100.0	100.0	0.008	100.0	0.008	100.0	0.008	100.0	0.008
Waterbirds										
American white pelican	**0.35**	**100.0**	**81.5**	**0.289**	**81.9**	**0.29**	**85.6**	**0.303**	**85.6**	**0.303**
Great blue heron	**<0.01**	**100.0**	**100.0**	**<0.001**	**100.0**	**<0.001**	**100.0**	**<0.001**	**100.0**	**<0.001**
Sandhill crane	**1.60**	**98.4**	**2.6**	**0.042**	**2.6**	**0.042**	**21.1**	**0.332**	**21.1**	**0.332**

Common Name	Overall Mean Use	Percentage Flying	Option 1				Option 2			
			GE 2.82 MW Turbine (25 to 155 m RSH)		GE 3.03 MW Turbine (10 to 155 m RSH)		GE 5.5 MW Turbine (45 to 205 m RSH)		SG 6.0 MW Turbine (30 to 200 m RSH)	
			Percentage Flying within RSH	Exposure Index	Percentage Flying within RSH	Exposure Index	Percentage Flying within RSH	Exposure Index	Percent Flying within RSH	Exposure Index
Waterfowl										
Canada goose	1.87	78.5	85.3	1.25	85.6	1.254	94.9	1.39	97.5	1.428
Greater white-fronted goose	0.01	100.0	100.0	0.011	100.0	0.011	57.1	0.006	100.0	0.011
Snow goose	12.96	98.0	75.5	9.579	76.3	9.681	81.7	10.372	98.3	12.479
Tundra swan	**0.01**	**100.0**	**0**	**0**	**100.0**	**0.011**	**0**	**0**	**0**	**0**
Unidentified goose	0.04	100.0	100.0	0.037	100.0	0.037	100.0	0.037	100.0	0.037

Source: Table 3.4-10 of the ASC (Horse Heaven Wind Farm 2021).

GE = General Electric; MW = megawatt; RSH = rotor swept height; SG = Siemens Gamesa

Bold text indicates special status bird species.

APPENDIX 4.10-1

Glare Analysis Inputs and Assumptions

This Page Intentionally Left Blank

Glare Analysis Inputs

The modules to be used for the proposed Project are smooth glass surface material with an anti-reflection coating (ARC), which are parameters selected in the glare analyses. Values associated with panel reflectivity and reflective scatter were not altered from the GlareGauge standard input averaged from various module reflectance profiles produced from module research concluded in 2016; therefore, as previously noted, the model does not incorporate further advances in anti-reflective coatings since that time (Sandia 2016[1]).

Due to capacity constraints in the Solar Glare Hazard Analysis Tool (SGHAT), which limits the number of drawn photovoltaic (PV) array areas to 20 per analysis, Tetra Tech performed eight separate glare analyses: two for Solar Array County Well (West 1) (Analysis 1 and 2), two for Solar Array Sellards (West 2) (Analysis 3 and 4), four for Solar Array East (Analyses 5 through 8). Each analysis evaluated separate "PV Array Areas," which are segmented polygons within each of the three larger solar array areas generally representative of the proposed Project layout as of November 2020. Analysis 1 and 2 consisted of 12 PV Array Areas, Analysis 3 and 4 consisted of 18 PV Array Areas, Analysis 5 and 6 consisted of 17 PV Array Areas, and Analysis 7 and 8 consisted of 13 PV Array Areas. Segmentation of the Project layout allows GlareGauge to more accurately represent potential ocular impacts as a result of the Project.

Each analysis run included proximal segmented vehicular traffic routes, as well as several residential receptors (also referred to as observation points [OPs]). The vehicular route and residential receptors were selected to provide a representation of proximal areas surrounding the Project that could experience glare. The route segment extents were based on the results of Tetra Tech's preliminary viewshed analysis for the Project. The residential receptors are a subset of the noise sensitive receptors analyzed for the Project as part of the acoustic assessment (see Section 4.10.1 and Appendix O in the Application for Site Certification), and retain the associated identification numbers for cross-reference in addition to the simplified OP numbering needed for the SGHAT. The analyses for each array area were run first from the point of view from an average first floor (6 feet) and typical commuter car height (5 feet), followed by an analysis from the point of view from an average second floor residential structure (16 feet) and commercial truck height above the road surface (9 feet). The additional input features used in the analyses are summarized in **Table 4.10-1A**.

Table 4.10-1A: Glare Analyses Input Features

Analysis No.	Racking Type	Module Orientation[(a)]	Tilt[(b)] (degrees)	Resting Angle (degrees) [(c)]	Module Height[(d)] (feet)	OP Height[(e)] (Feet)	Route Height[(f)] (feet)
1	Single Axis Tracking	East-to-West-facing	Variable	10	8	6	5
2	Single Axis Tracking	East-to-West-facing	Variable	10	8	16	9
3	Single Axis Tracking	East-to-West-facing	Variable	10	8	6	5
4	Single Axis Tracking	East-to-West-facing	Variable	10	8	16	9
5	Single Axis Tracking	East-to-West-facing	Variable	10	8	6	5
6	Single Axis Tracking	East-to-West-facing	Variable	10	8	16	9

[1] Sandia (Sandia National Laboratories). 2016. Solar Glare Hazard Analysis Tool (SGHAT) User's Manual v. 3.0. December 6, 2016.

Table 4.10-1A: Glare Analyses Input Features

Analysis No.	Racking Type	Module Orientation[a]	Tilt[b] (degrees)	Resting Angle (degrees) [c]	Module Height[d] (feet)	OP Height[e] (Feet)	Route Height[f] (feet)
7	Single Axis Tracking	East-to-West-facing	Variable	10	8	6	5
8	Single Axis Tracking	East-to-West-facing	Variable	10	8	16	9

Source: Horse Heaven Wind Farm, LLC. 2021d. Glare Analysis Report for the Horse Heaven Wind Farm. January 2021. Appendix H of Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification. EFSEC Docket Number: EF-210011.
Notes:
[a] PV Array Areas modeled as single axis tracking modules from east-facing in the morning hours to west-facing in the evening hours.
[b] The module tilt varies through the day as they track the sun, the maximum tracking angle tilt is ±50˚.
[c] The resting angle is used to model module backtracking when the sun is outside of the module rotation range. A resting angle of 10 assumes that the modules immediately revert back to 10˚ (backtrack) when the sun is outside of the rotation range.
[d] Average module centroid height above ground surface.
[e] Height of observation point receptor: 6 feet represents an average first floor residential/commercial point of view and 16 feet represents an average second floor residential/commercial point of view.
[f] Height of vehicular route receptor: 5 feet represents typical commuter car height views, and 9 feet represents typical semi tractor-trailer truck views.
OP = Observation Point

Glare Analysis Assumptions

The GlareGauge model is bound by conservative limitations. The following assumptions provide a level of conservatism to the GlareGauge model:

- The GlareGauge model simulates PV arrays as infinitesimally small modules within planar convex polygons exemplifying the tilt and orientation characteristics defined by the user. Gaps between modules, variable heights of the PV array within the polygons, and supporting structures are not considered in the analysis. Because the actual module rows will be separated by open space, this model assumption could result in an indication of glare in locations where panels will not be located. In addition, the supporting structures are considered to have reflectivity values that are negligible relative to the module surfaces included in the model.
- The GlareGauge model utilizes a simplified model of backtracking, which assumes panels instantaneously revert to the “resting angle” whenever the sun is outside the rotation range.
- The GlareGauge model assumes that the observation point receptor can view the entire PV array segment when predicting glare minutes; however, it may be that the receptor at the observation point may only be able to view a small portion (typically the nearest edge) of the PV array segment. Therefore, the predicted glare minutes and intensity from a specific PV array to a specific observation point are conservative because the observer will likely not experience glare from the entire PV array segment at once.
- The GlareGauge model does not consider obstacles (either man-made or natural) between the defined PV arrays and the receptors such as vegetative screening (existing or planted), buildings, topography, etc. Where such features exist, they would screen views of the Project and, thus, minimize or eliminate glare from those locations.

- The GlareGauge model does not consider the potential effect of shading from existing topography between the sun and the Project outside of the defined areas.
- The direct normal irradiance (DNI) is defined as variable using a typical clear day irradiance profile. This profile has a lower DNI in the mornings and evenings and a maximum of 1,000 watts per square meter (W/m^2) at solar noon. The irradiance profile uses the coordinates from Google Maps and a sun position algorithm to scale the DNI throughout the year. The actual daily DNI would be affected by precipitation, cloud cover, atmospheric attenuation (radiation intensity affected by gaseous constituents), and other environmental factors not considered in the GlareGauge model. This may result in modeled predicted glare occurrences when in fact the glare is not actually occurring due to cloud cover, rain, or other atmospheric conditions.

Note that hazard zone boundaries shown in the Glare Hazard plots are an approximation; actual ocular impacts encompass a continuous, not discrete, spectrum.

This Page Intentionally Left Blank

APPENDIX 4.11-1

Inputs for Noise Modeling Assessment

This Page Intentionally Left Blank

Inputs for Noise Modeling Assessment

Noise sources are input in terms of frequency distributed sound power levels, which are outlined in the source tables below. This provides not only an overall noise source, but also how that overall noise is distributed across octave band frequencies (low to high). Coordinates for sources, receptors, and any other object can be specified by the user. All noise sources are assumed to be point sources.

Sound propagation is calculated by accounting for distance attenuation via hemispherical spreading and three other user-identified noise attenuation options: atmospheric attenuation, path-specific attenuation, and barrier attenuation. Atmospheric attenuation is calculated using the data specified in the International Standards Organization Attenuation of Sound During Propagation Outdoors, Part 1: Calculations of the Absorption of Sound by the Atmosphere (ISO 1993[1]). Path-specific attenuation can be specified to account for the effects of ground, vegetation, foliage, and wind shadow. Directional source characteristics and reflection can be simulated using path-specific attenuation. Attenuation due to barriers can be specified by giving the coordinates of the barrier. Barrier attenuation is calculated by assuming a defined barrier perpendicular to the source-receptor path. Total and A-weighted sound pressure levels (SPLs) are calculated.

Table 4.11-1A lists the configuration of the calculation parameters used to complete noise modeling for the Project.

Table 4.11-1A: Noise Model Configuration Parameters

Parameter	Model Setting	Description/Notes
Standards	ISO 9613 only	All sources and attenuators are treated as required by the cited standard.
Directivity	k-factor = 2 dBA (for Turbine blade noise sources)	Assumed that turbine blade directivity and sound-generating efficiencies are inherently incorporated in the noise source data used in developing the acoustic model. The specification for the turbines includes an expected warranty confidence interval, or k-factor, which was added to the nominal sound power level in the acoustic model.
Ground Absorption	0.5	Mixed (semi-reflective) soft and hard ground, conservative assumption given the area is mostly composed of fields.
Temperature/humidity	10°C (50° F) / 70% relative humidity	Assumed weather conditions.
Wind Conditions	Default ISO 9613-2 – moderate inversion condition	The propagation conditions in the ISO standard are valid for wind speeds between 4 and 18 km/hr; all points are considered downwind (omnidirectional).
Terrain	Existing terrain considered	Existing ridgeline and changes in elevation in the impact area will affect sound propagation.
Operations	Continuous	All equipment operating continuously during the daytime and at night. Conservative assumption considering operations will be dependent on weather conditions.
Noise Mitigation	None	The model does not include natural buffers, existing or future foliage, or existing or future buildings or structures.

Source: Horse Heaven Wind Farm, LLC. 2021. Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification EFSEC Docket Number: EF-210011. February.
°C = degrees Celsius; °F = degrees Fahrenheit; dBA = A-weighted decibels; ISO = International Standards Organization; km/hr = kilometers per hour

[1] ISO (International Organization for Standardization). 1993. Standard ISO 9613-2 Acoustics – Attenuation of Sound during Propagation Outdoors. Part 2 General Method of Calculation. Geneva, Switzerland.

This Page Intentionally Left Blank

APPENDIX 4.16-1

Technical Review of Horse Heaven Wind Farm, LLC's Economic Impact Analysis Methodology

This Page Intentionally Left Blank

Economic IMPLAN Model

Tetra Tech, Inc. on behalf of Horse Heaven Windfarm, LLC (the Applicant), prepared an IMPLAN analysis of the Horse Heaven Wind Farm (Project) (Horse Heaven Wind Farm, LLC 2021[1]). IMPLAN is a regional input-output model widely used to assess the economic impacts of energy and many other types of projects. The IMPLAN model divides the economy into 546 sectors, including government, households, farms, and various industries, and models the linkages between the various sectors. The linkages are modeled through input-output tables that account for all dollar flows among different sectors of the economy.

Using national industry and state-level economic data derived from the U.S. Bureau of Economic Analysis, U.S. Census, and other government sources, IMPLAN models how money spent in one sector of the economy is spent and re-spent in other sectors. By tracing these linkages, the model approximates the flows of initial project spending through the local economy based on the supply lines connecting the various economic sectors. These linkages vary by sector, as well as through regional differences in spending and employment patterns. The amount spent locally decreases with each successive transaction away from the initial expenditure due to the effects of savings, taxes, or other activities that happen outside the local economy, known as leakages.

The economic relationships modeled by IMPLAN allow the user to estimate the overall change in the economy that would result from construction and operation of a proposed project. The dollars spent on project construction and operation within a selected analysis area are analyzed to determine the total economic impact within that area. The direct investments in project construction and operation trigger successive rounds of spending that result in an overall increase in employment, labor income, and economic output in the local economy. Construction-related impacts are assessed as one-time impacts; operations and maintenance–related impacts are modeled as annual impacts (Horse Heaven Wind Farm, LLC 2021).

Workforce Requirements and Economic Impacts

For the Project, Project Management and Engineers would account for 3 to 4 percent of total employment for conceptualized Phases 1, 2a, and 2b, and Field Technical Staff would account for 9 to 11 percent, viewed in terms of total months of employment. The remaining employment would be made up of Skilled Labor and Equipment Operators and Unskilled Labor, with the relative distribution between these categories varying by task (Horse Heaven Wind Farm, LLC 2021). Workers in the Skilled Labor and Equipment Operators category, for example, would account for the majority of employment during wind turbine assembly, while the majority of the workforce installing turbine foundations would fall under the Unskilled Labor category.

Table 4.16-1A provides an estimate of the workforce necessary to construct Phases 1, 2a, and 2b. The Applicant anticipates that on-site jobs would be filled mostly by local workers. Classes of on-site jobs include those associated with site work, foundations, electrical work, and other construction-related labor needs. The Applicant acknowledges in the Application for Site Certification that workers from outside the region may be required to fill certain on-site positions. However, the Applicant did not include the potential for non-local workers in their workforce estimates but did evaluate the impact of per diem spending by non-local workers on the region's economy. These estimates are one-time impacts for the 11-month construction period developed using the IMPLAN modeling software and 2019 IMPLAN data for Benton and Franklin Counties.

[1] Horse Heaven Wind Farm, LLC. 2021. Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification EFSEC Docket Number: EF-210011. February.

The employment estimates presented in the ASC represent the average and peak numbers of people expected to be employed on site at one time and are not expressed in full-time equivalents. The workforce estimates provided by the Applicant assume that the Project would be built under a community workforce or Project labor agreement that would include the use of apprentices for 15 percent of the labor hours. The economic impact analysis, therefore, increased initial workforce estimates by 15 percent to account for apprentices.

Table 4-16.1A: Average Monthly Workforce Estimates by Technical Professional and Level

Task	Phase	Project Management and Engineers	Field Technical Staff	Skilled Labor and Equipment Operators	Unskilled Labor	Apprentice
Final Engineering and Design	1	5	0	0	0	0
Pre-Construction Survey and Compliance Requirements	1	1	4	0	0	0
Road Construction	1	2	1	15	12	5
Wind Turbine Foundations	1	2	5	30	88	19
Wind Turbine Assembly	1	2	10	118	20	23
Wind Plant Commissioning	1	1	19	0	0	3
Solar Array Construction	1	3	4	14	40	70
Electrical System Installation	1	2	5	19	56	12
Battery Energy Storage System	1	1	2	6	18	4
Solar Plant Commissioning	1	1	1	5	15	3
Electrical System and Substation	1	2	10	28	10	8
O&M Facilities	1	2	5	10	18	5
Final Engineering and Design	2a	5	0	0	0	0
Pre-Construction Survey and Compliance Requirements	2a	1	4	0	0	0
Road Construction	2a	2	1	13	10	4
Wind Turbine Foundations	2a	2	3	20	63	13
Wind Turbine Assembly	2a	2	7	81	15	16
Wind Plant Commissioning	2a	1	15	0	0	2

Table 4-16.1A: Average Monthly Workforce Estimates by Technical Professional and Level

Task	Phase	Project Management and Engineers	Field Technical Staff	Skilled Labor and Equipment Operators	Unskilled Labor	Apprentice
Solar Array Construction	2a	3	3	12	33	8
Electrical System Installation	2a	2	4	16	47	10
Battery Energy Storage System	2a	1	2	6	18	4
Solar Plant Commissioning	2a	1	1	4	13	3
Electrical System and Substation	2a	3	15	38	15	11
O&M Facilities	2a	2	5	10	18	5
Transmission Line Construction	2a	1	2	12	0	2
Final Engineering and Design	2b	5	0	0	0	0
Pre-Construction Survey and Compliance Requirements	2b	1	4	0	0	0
Road Construction	2b	4	1	25	20	8
Wind Turbine Foundations	2b	3	7	40	125	26
Electrical System and Substation	2b	3	15	38	15	11
Wind Turbine Assembly	2b	3	14	162	31	32
O&M Facilities	2b	2	5	10	18	5
Transmission Line Construction	2b	2	4	23	0	4
Plant Commissioning	2b	1	29	0	0	5

Sources:
Horse Heaven Wind Farm, LLC. 2021. Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification EFSEC Docket Number: EF-210011. February.
Tetra Tech, Inc. 2021. Economic Impact Assessment of the Horse Heaven Wind Farm. Appendix J.
O&M = operations and maintenance

The Application for Site Certification states that construction workforces for Phases 1, 2a, and 2b would vary over the course of the construction schedule. The following summarizes the low, mean, and high workforce estimates for each conceptual construction phase:

- Construction for Phase 1 is estimated to take place over an 11-month period. On-site activities would employ an average of 300 workers over the 11-month construction period. Viewed by month, on-site employment would range from a low of 26 workers to a high of 467 workers.
- Construction for Phase 2a is assumed to take place over an 11-month construction period. An estimated average of 267 workers per month would be employed over the 11-month construction schedule, with estimated monthly employment ranging from a low of 22 to a high of 430 jobs.
- The construction period for Phase 2b is assumed to be 10 months. An average of 271 workers per month would be employed over the 10-month construction period, with estimated monthly employment ranging from a low of 35 jobs to a high of 412 jobs (Horse Heaven Wind Farm, LLC. 2021).

The economic impact of the Project's construction phase for Phases 1, 2a, and 2b are summarized for Benton and Franklin Counties in **Table 4.16-1B**. These estimates are one-time impacts for the 11-month construction period developed using the IMPLAN modeling software and 2019 IMPLAN data for Benton and Franklin Counties.

Table 4.16-1B: One-Time Construction Impacts

Construction Phase	Impact	FTE Jobs	Labor Income $ (million)	Economic Output $ (million)
Phase 1	Direct	171	19.4	19.4
Phase 1	Indirect	168	11.1	30.7
Phase 1	Induced	118	6.5	20.5
Phase 2a	Direct	152	17.2	17.2
Phase 2a	Indirect	199	13.8	35
Phase 2a	Induced	120	6.6	20.8
Phase 2b	Direct	136	15.7	15.7
Phase 2b	Indirect	269	18.8	46.7
Phase 2b	Induced	135	7.4	23.4

Sources:
Horse Heaven Wind Farm, LLC. 2021. Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification EFSEC Docket Number: EF-210011. February.
Tetra Tech, Inc. 2021. Economic Impact Assessment of the Horse Heaven Wind Farm. Appendix J.
FTE = full-time equivalent

The economic impact of the Project's operations phase for Phases 1, 2a, and 2b for Benton and Franklin Counties is summarized in **Table 4.16-1C**. These estimates are annual average impacts based on estimated operations and maintenance expenditures for a 35-year period of operation.

Table 4.16-1C: Annual Operational Impacts on Employment and Income

Construction Phase	Impact	FTE Jobs	Labor Income $ (million)	Economic Output $ (million)
Phase 1	Direct	11	1.0	1.0
Phase 1	Indirect	12	0.9	3.0
Phase 1	Induced	9	0.5	1.5
Phase 2a[(a)]	Direct	9	0.8	0.8
Phase 2a[(a)]	Indirect	9	0.7	2.2
Phase 2a[(a)]	Induced	7	0.4	1.1
Phase 2b[(a)]	Direct	9	0.8	0.8
Phase 2b[(a)]	Indirect	10	0.9	3.2
Phase 2b[(a)]	Induced	7	0.4	1.3

Sources:
Horse Heaven Wind Farm, LLC. 2021. Horse Heaven Wind Farm Washington Energy Facility Site Evaluation Council Application for Site Certification EFSEC Docket Number: EF-210011. February.
Tetra Tech, Inc. 2021. Economic Impact Assessment of the Horse Heaven Wind Farm. Appendix J.
[(a)] = Operational workforce estimates are based on if only Phase 2a or 2b were constructed. If both Phase 2a and 2b are constructed the estimated operational employment impact (direct, indirect, and induced) would range from 24 to 26 FTEs.
FTE = full-time equivalent

This Page Intentionally Left Blank