2021 Botany and Habitat Survey Report for Horse Heaven Wind Farm

Benton County, Washington

Prepared for

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ACRONYMS AND ABBREVIATIONS

CRP	Conservation Reserve Program
GPS	Global Positioning System
IPaC	Information for Planning and Consultation
NHD	National Hydrography Dataset
NWI	National Wetlands Inventory
PHS	Priority Habitat and Species
Project	Horse Heaven Wind Farm
Tetra Tech	Tetra Tech, Inc.
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WDFW	Washington Department of Fish and Wildlife
WNHP	Washington Natural Heritage Program

1 INTRODUCTION

This report presents the methods and results for the 2021 botanical and habitat surveys conducted by Tetra Tech, Inc. (Tetra Tech) for the Horse Heaven Wind Farm (Project). The Project is located within Benton County, approximately 2.5 miles south of Benton City and 6 miles south of Kennewick, Washington (Figure 1). In 2020, Tetra Tech conducted botanical and habitat surveys in locations associated with 44 proposed wind turbine generators preliminarily identified as occurring within native habitat (Tetra Tech 2021). The purpose of the 2021 botanical and habitat surveys was to document the presence of special status vascular plant and noxious weed species and verify, map, and characterize habitat within portions of the Project Wind Energy Micrositing Corridor and Solar Siting Areas not completed in 2020 (Figure 2).

2 METHODS

2.1 Survey Area

The 2021 Survey Area consisted of portions of the Project Wind Energy Micrositing Corridor and Solar Siting Areas that were not surveyed in 2020 (Figure 2). At the time of the surveys, access was not permitted to two parcels totaling 604 acres within the southwestern Solar Siting Area. With the exception of these two parcels, all portions of the Wind Energy Micrositing Corridor and Solar Siting Areas not completed in 2020 were surveyed in 2021. The 2021 Survey Area consisted of 18,338 acres. Although the parcels where access was not permitted were not traversed on foot during surveys (or considered part of the 2021 Survey Area), they were viewed from public roads and adjacent accessible parcels to the extent possible.

2.2 Background Review

2.2.1 Special Status Plant Species

Prior to conducting field surveys, Tetra Tech conducted a pre-field review of existing information on special status plant species with the potential to occur in Benton County and within the 2021 Survey Area. For purposes of this report, the term "special status plant" includes federally-listed endangered, threatened, or candidate vascular plant species and state endangered, threatened, and sensitive vascular plant species as defined by the Washington Natural Heritage Program (WNHP). Specific sources of information that were reviewed prior to conducting field surveys include the following:

- U.S. Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) query for Benton County (USFWS 2021a);
- Washington Natural Heritage Rare Vascular and Nonvascular Species, County Lists (WNHP 2021a);
- Washington Vascular Plant Species of Special Concern (WNHP 2019);
- WNHP Element Occurrence database of rare and imperiled species and plant communities (WNHP 2021b);
- Online Field Guide to the Rare Plants of Washington (WNHP 2021c);
- USFWS National Wetlands Inventory (NWI; USFWS 2021b); and
- U.S. Geological Survey (USGS) National Hydrography Dataset (NHD; USGS 2021)

Based on review of the above sources, Tetra Tech compiled a list of special status vascular plant species known to occur or with the potential to occur in the 2021 Survey Area (Attachment A). Each of the species identified as potentially occurring within the 2021 Survey Area was assigned a "likelihood of occurrence" (i.e., highly unlikely, low, moderate) based on the proximity of known occurrences, whether the known occurrence is a historical occurrence, and the likelihood of suitable habitat occurring within the 2021 Survey Area (Attachment A). Tetra Tech also reviewed aerial imagery of the 2021 Survey Area to identify potential habitat for special status plant species within the 2021 Survey Area.

Prior to conducting field surveys, Tetra Tech reviewed existing literature, herbarium records, and other sources to generate fact sheets or "field guides" for each special status plant species with the potential to occur within the 2021 Survey Area. These fact sheets were used by surveyors in the field and included:

- Photographs of each species and its habitat;
- Information detailing habitat associations;
- Range and flowering period;
- Identifying features; and
- Characteristics distinguishing the target species from similar species within its range.

2.2.2 Noxious Weeds

Prior to field surveys, Tetra Tech reviewed lists of species designated as noxious weeds in Washington State and Benton County (BCNWCB 2020; WSNWCB 2021). Additionally, existing literature and other sources were reviewed to familiarize surveyors with identification of designated noxious weeds that would potentially be encountered within the 2021 Survey Area.

2.2.3 Habitat

Prior to conducting field surveys, Tetra Tech conducted a desktop review to preliminarily identify habitat types within the 2021 Survey Area. Sources reviewed for the preliminary habitat classification included the following:

- National Land Cover Database land cover data (Homer et al. 2020);
- Site Characterization Study Report, Badger Canyon Wind Project (Chatfield and Thompson 2018a);
- Site Characterization Study Report, Four Mile Wind Project (Chatfield and Thompson 2018b);
- Results of the 2018 vegetation and land cover mapping for the Badger Canyon Wind Project (Chatfield and Brown 2018a);
- Results of the 2018 vegetation and land cover mapping for the Four Mile Wind Project (Chatfield and Brown 2018b);
- Wildlife Survey Report for the Horse Heaven Wind Project (Jansen and Brown 2018);
- Washington Department of Fish and Wildlife (WDFW) Priority Habitat and Species (PHS) database (WDFW 2021);
- USFWS NWI (USFWS 2021b);
- USGS NHD (USGS 2021);
- Management recommendations for Washington's priority habitats (Azerrad et al. 2011);
- Washington Large Fires 1973-2020 (DNR 2021); and
- SAGEMAP Sagebrush Habitat (USGS 2011).

Based on review of the above sources, preliminary habitat boundaries within the 2021 Survey Area were delineated. These preliminary habitat boundaries were uploaded to Samsung Galaxy tablets using ArcGIS Collector mapping software for field verification of habitat types during field surveys.

2.3 Field Surveys

Field surveys were conducted May 31–June 4, 2021. The survey dates were chosen as they coincide with the identification period for the majority of special status plant species with the potential to occur within the 2021 Survey Area.

2.3.1 Special Status Plant Survey Methods

Special status vascular plant field surveys were conducted using the focused intuitive controlled survey method, a standard and commonly accepted survey protocol (USFS and BLM 1998). This method incorporates meandering transects that traverse the survey area and that target the full array of major vegetation types (with the exception of agricultural fields as they do not support special status plant species), aspects, topographical features, habitats, and substrate types. The distribution of survey effort is based on habitat conditions observed in the field and surveyor experience and knowledge of rare plant species and their habitats. Areas that provide marginal potential habitat for rare plant species (e.g., areas dominated by non-native species) are surveyed with less intensity than areas of high-potential habitat for special status plant species (e.g., intact shrub-steppe habitat). While traversing the 2021 Survey Area, the surveyors searched for special status vascular plant species, and when the surveyors arrived at an area of high-potential habitat for special status species, they conducted a complete survey for the special status species. Complete surveys include an examination of 100 percent of the habitat.

During surveys, Tetra Tech maintained a running list of vascular plant species encountered within the 2021 Survey Area and made informal collections of unknown species for later identification. Identification was verified by the use of appropriate plant keys, in particular, *Flora of the Pacific Northwest* (Hitchcock and Cronquist 2018).

2.3.2 Noxious Weeds

Noxious weed surveys were conducted concurrently with special status plant and habitat surveys. Tetra Tech recorded observations of state- and county-designated noxious weeds. When a noxious weed was encountered in the 2021 Survey Area, the location was recorded with a global positioning system (GPS) point and the species, estimated size of the infestation (<0.1 acre; 0.1–1.0 acre; 1.0–5.0 acres), and relative abundance (sparse; common; high cover) was recorded.

2.3.3 Habitat

Tetra Tech conducted habitat surveys concurrently with special status and noxious weed surveys. Surveys consisted of a combination of roadside and pedestrian (i.e., walking) surveys. Where accessible by roads, agricultural and disturbed/developed lands were typically documented from the roadside, and the type of agriculture (e.g., wheat) or disturbance (e.g., cell tower) and status of each agricultural field (e.g., fallow, active) were noted. For non-agricultural lands and vegetated portions of disturbed or developed lands, biologists conducted pedestrian surveys that consisted of walking meandering transects throughout the area. Field surveys were conducted by a team of two biologists familiar with eastern Washington Columbia Plateau Ecoregion habitats, WDFW priority habitats (WDFW 2008), and the WDFW Wind Power Guidelines habitat categories[1] (WDFW 2009).

[1] The WDFW Wind Power Guidelines (WDFW 2009) provide specific management recommendations, alternatives for site assessment, and mitigation options and construction alternatives for avoiding impacts to Washington's wildlife resources and habitat for proposed wind power projects. Currently, there are no similar guidelines for solar power projects.

During field surveys, habitat types within the 2021 Survey Area were documented, mapped, and characterized. In general, habitat types were adapted from habitat descriptions in the WDFW Wind Power Guidelines (WDFW 2009) and *Wildlife-habitat Relationships in Oregon and Washington* (Johnson and O'Neil 2001). Preliminary habitat classifications identified during the desktop review (see Section 2.2.3) were revised either by modifying habitat boundaries in the field utilizing the tablets and ArcGIS Collector mapping software and/or drawing revised boundaries (based on field data collection and observations described below) in Google Earth that were then digitized following the field surveys.

To help characterize and map habitat types, biologists collected GPS habitat points. Information collected at these habitat points included the percent cover, using Daubenmire cover classes (NRCS and BLM 1996), of the following:

- Total vegetation cover
- Total tree and shrub cover
- Total cover of native and non-native grasses
- Total cover of non-native species
- Total cover of annual and perennial forbs
- Cover of standing dead shrubs or trees
- Cover of litter, rock, and bare ground
- Percent cover of dominant tree, shrub, and grass species

In addition, a list of dominant forbs, as well as observed disturbances (e.g., grazing), and a general assessment of habitat quality (e.g., poor, moderate, high) were also recorded at each habitat point and a photo of the habitat was taken. In addition to walking meandering transects, the biologists scanned the adjacent landscape from vantage points that allowed views across the landscape to help map habitat boundaries.

3 RESULTS

3.1 Background Review

3.1.1 Special Status Plants

Based on the background review, one federally listed threatened vascular plant species, the Umtanum desert buckwheat (*Eriogonum codium*), is known to occur within Benton County (USFWS 2021a). However, this species has a highly restricted distribution, and the entire known population occurs in a 1.9-acre area on the eastern end of Umtanum Ridge within the Hanford Reach National Monument, which is more than 25 miles north of the Project Lease Boundary (USFWS 2019). Additionally, the approximately 5 acres of designated critical habitat for Umtanum desert buckwheat is restricted to this region along Umtanum Ridge (i.e., outside the Project Lease Boundary).

Including Umtanum desert buckwheat, which in addition to being federally listed as threatened is also considered a state endangered species, 29 state endangered, threatened, or sensitive vascular plant species are known or have the potential to occur in Benton County (WNHP 2021a). Attachment A provides the list of the 29 special status plant species known or potentially occurring in Benton County, as well as their state and federal status, preferred habitat, likelihood of occurring in the 2021 Survey Area, and recommended survey period. As noted in Attachment A, one state threatened vascular plant species, grey

cryptantha (*Cryptantha leucophaea*), has been documented within 5 miles of the eastern border of the Project Lease Boundary (WNHP 2021b); however, this occurrence is across the Columbia River from the Project Lease Boundary.

During the background review, one special status lichen species, woven-spore lichen (*Texosporium sancti-jacobi*), was also identified as having the potential to occur in the 2021 Survey Area (WNHP 2021a). This species is listed as threatened in the state by the WNHP. Woven spore-lichen has been documented at four separate locations within approximately 3 miles of the Project Lease Boundary, with the closest occurrence approximately 0.4 mile to the north (WNHP 2021b).

3.1.2 Noxious Weeds

Based on the background review, 155 species are currently designated as noxious weeds in Washington State, and 124 species are currently designated as noxious weeds in Benton County (BCNWCB 2020; WSNWCB 2021). Per the WSNWCB (2021), the following are the definitions for each class of noxious weed:

- **Class A Weeds**: Non-native species whose distribution in Washington is still limited. Preventing new infestations and eradicating existing infestations are the highest priority. Eradication of all Class A plants is required by law.
- **Class B Weeds**: Non-native species presently limited to portions of the 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 a Class B species is already abundant, control is decided at the local level, with containment as the primary goal.
- **Class C Weeds**: Noxious weeds that are typically widespread in Washington 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.

3.1.3 Habitat

Existing habitat conditions within the Survey Area are influenced by existing and past land uses, as well as historic fires that have affected the region. Therefore, a background review was conducted to determine the known extent of existing habitat conditions and historic fires within the area that have been recorded in public databases.

The WDFW PHS query identified one priority habitat, shrub-steppe, within and adjacent to much of the northern edge of the Project Lease Boundary and within portions of the 2021 Survey Area. SAGEMAP data identified sagebrush habitat as present scattered throughout the 2021 Survey Area (USGS 2011). The NHD maps 40.4 miles of intermittent streams within the 2021 Survey Area (USGS 2021). Desktop review of NWI data identified 0.25 acre of freshwater emergent wetlands and 96.3 acres of riverine wetlands within the 2021 Survey Area (USFWS 2021b). Nine fires were identified as overlapping the Project Lease Boundary between 1973 and 2020, eight of which overlap a portion of the 2021 Survey Area (Figure 3; DNR 2021).

3.2 Field Surveys

3.2.1 Special Status Plants

No special status vascular plant species were observed within the 2021 Survey Area during surveys conducted in 2021. In addition, very little suitable habitat for special status vascular plant species was observed (Attachment A). The list of vascular plant species observed within the 2021 Survey Area is provided as Attachment B.

Although field surveys in 2020 and 2021 were focused on special status vascular plants, a habitat suitability assessment for woven-spore lichen was conducted to identify potential suitable habitat at the Project for this species. The habitat suitability assessment is provided in Attachment C. Based on this assessment, approximately 18.9 acres within the Wind Energy Micrositing Corridor and Solar Siting Areas may provide suitable habitat for woven-spore lichen.

3.2.2 Noxious Weeds

Tetra Tech recorded six state- and county-designated noxious weed species during field surveys. Table 1 lists the noxious weed species observed, their noxious weed designation, and the frequency of observations. Figure 4 shows the locations of noxious weeds observed during field surveys.

Table 1. Noxious Weeds Observed During 2021 Botanical Field Surveys

Scientific Name	Common Name	State and County Class[1]	Frequency
Bassia (Kochia) scoparia	kochia	B	Abundant. Frequently observed throughout the 2021 Survey Area.
Centaurea sp.[2]	knapweed	B	Commonly observed in central portion of 2021 Survey Area. Also observed in several locations in eastern and western portion of 2021 Survey Area.
Chondrilla juncea	rush skeletonweed	B	Commonly observed throughout 2021 Survey Area.
Convolvulus arvensis	field bindweed	C	Observed in two locations in eastern portion of 2021 Survey Area.
Onopordum acanthium	Scotch thistle	B	Observed in five locations in central-eastern portion of 2021 Survey Area.
Secale cereale	cereal rye	C	Abundant. Frequently observed throughout 2021 Survey Area.

Notes:
[1] Definitions for weed classes are provided in Section 3.1.2.
[2] Individuals observed were not flowering at the time of surveys. Based on observations of rosettes and leaves, individuals and populations are believed to be either diffuse knapweed (*Centaurea diffusa*) or spotted knapweed (*Centaurea stoebe*) which are both designated Class B weeds.

Two noxious weed species were abundant throughout the 2021 Survey Area: kochia and cereal rye. Kochia was frequently observed along roadsides and along the edges of agricultural fields throughout the 2021 Survey Area. Although a few small (<0.1 acre) infestations of kochia were observed, most infestations were larger than 0.l acre and many were larger than 1 acre. Large (greater than 1 acre), dense patches of cereal rye were frequently observed throughout the 2021 Survey Area. This noxious weed was often observed on hillslopes adjacent to agricultural fields or drainages and formed almost a complete monoculture in many the locations where it was observed.

Both knapweed and rush skeletonweed were commonly observed in the 2021 Survey Area. Knapweed was primarily observed in the central portion of the 2021 Survey Area. Patches ranged from small (<0.1 acre) to large (1-5 acres) patches that consisted of sparse, scattered individuals to areas with a high cover of knapweed. The knapweed individuals were not flowering at the time of the field surveys; however, based on the rosettes and leaf characteristics, it is assumed that individuals observed were either diffuse knapweed or spotted knapweed. Tetra Tech documented rush skeletonweed in scattered locations throughout much of the 2021 Survey Area, with the exception of the northwest portion (Figure 4). Although most patches of rush skeletonweed were either small (<0.1 acre) or medium (0.1-1 acre) in size, several larger infestations (1-5 acres) were observed scattered throughout the central portion of the 2021 Survey Area. Typically, observations of rush skeletonweed consisted of small patches or individuals scattered throughout the area, instead of occurring in dense populations.

Scotch thistle was observed in five locations in the 2021 Survey Area: all in the central-eastern portion of the 2021 Survey Area (Figure 4). Three of the five infestations were between approximately 0.1 and 1 acre in size with many Scotch thistle plants, while two infestations were small (<0.1 acre) and consisted of just a few plants. Two small (<0.1 acre) infestations of field bindweed were observed: one in the northeastern portion and one in the central-eastern portion of the 2021 Survey Area (Figure 4).

Cereal rye is a Class C noxious weed, indicating that it is either widespread in the state or is of interest to the state's agricultural industry. The other four species observed are Class B noxious weeds, meaning that they are designated for required control in regions where they are not yet widespread and preventing new infestations in these areas is a high priority. In regions where these species are already abundant, control is decided at the local level, with containment as the primary goal (WSNWCB 2021).

3.2.3 Habitat

The following seven habitat types were field mapped within the 2021 Survey Area:

- Agricultural land
- Developed/disturbed
- Eastside (interior) grassland
- Non-native grassland
- Planted grassland
- Rabbitbrush shrubland
- Sagebrush shrub-steppe

Table 2 lists the acres of each habitat type found within the 2021 Survey Area, and Figure 5 displays the locations of habitat types mapped within the 2021 Survey Area. Each of these habitat types is briefly described below. Representative photos of habitat types observed during field surveys are provided in Attachment D. As noted in Section 2.1, access to two parcels totaling 604 acres within the southwestern Solar Siting Area was not permitted during the 2021 surveys. While these areas were not traversed on foot or considered part of the 2021 Survey Area, they were viewed from adjacent accessible parcels and public roads to the extent possible. Of these 604 acres, it was determined that approximately 595 acres (99 percent) consisted of cultivated agricultural land. Based on a desktop review of the areas that were not able to be viewed from adjacent parcels or public roads, the remaining approximately 9 acres (1 percent) was determined to potentially consist of non-native grassland (6 acres) and sagebrush shrub-steppe (3 acres).

In general, vegetation within the majority of the 2021 Survey Area has been heavily modified due to historic and current agriculture and grazing activity. Non-native invasive grasses and forbs, such as bulbous bluegrass, cereal rye, cheatgrass, prickly lettuce, Russian thistle, tall tumblemustard, and yellow salsify, are prevalent throughout the 2021 Survey Area.

Table 2. Habitat Types Mapped within the 2021 Survey Area

Habitat Type	Acres in Survey Area (Percent of Survey Area)	Common Plant Species Observed[1]
Agricultural land	15,273 (83%)	Wheat or fallow wheat fields. In addition to wheat, several non-native grasses and forbs were observed in agricultural fields, including: Grasses: **cereal rye (*Secale cereale*), cheatgrass (*Bromus tectorum*)** Forbs: **kochia (*Bassia* [*Kochia*] *scoparia*), prickly lettuce (*Lactuca serriola*), Russian thistle (*Salsola tragus*)**
Developed/disturbed	221 (1%)	No to limited vegetation observed. Where vegetation exists, species are similar to those listed under the non-native grassland habitat type.
Eastside (interior) grassland[2]	174 (1%)	Shrubs: green rabbitbrush (*Chrysothamnus viscidiflorus*), rubber rabbitbrush (*Ericameria nauseosa*) Grasses: bluebunch wheatgrass (*Pseudoroegneria spicata*), **bulbous bluegrass (*Poa bulbosa*), cheatgrass, cereal rye,** Great Basin wildrye (*Leymus cinereus*), needle-and-thread (*Hesperostipa comata*), Sandberg bluegrass (*Poa secunda* ssp. *secunda*) Forbs: Carey's balsamroot (*Balsamorhiza* careyana), **common stork's bill** (*Erodium cicutarium*), fiddleneck (*Amsinckia* spp.), lupine (*Lupinus* spp.), **prickly lettuce,** shaggy fleabane (*Erigeron pumilus*), Spalding's milkvetch (*Astragalus spaldingii*), **tall tumblemustard,** triternate biscuit-root (*Lomatium triternatum*), wild blue flax (*Linum lewisii* var. *lewisii*), woolly plantain (*Plantago patagonica*), woollypod milkvetch (*Astragalus purshii*), yarrow (*Achillea millefolium*), **yellow salsify (*Tragopogon dubius*)**
Non-native grassland	929 (5%)	Shrubs: rubber rabbitbrush (only occasionally observed, and when observed was very sparse) Grasses: **bulbous bluegrass, cereal rye, cheatgrass** Forbs: fiddleneck, **kochia, prickly lettuce, Russian thistle, tall tumblemustard,** yarrow, **yellow salsify**
Planted grassland	602 (3%)	Shrubs: rubber rabbitbrush Grasses: big bluegrass (*Poa secunda* ssp. *juncifolia*), bluebunch wheatgrass, **cereal rye, cheatgrass, crested wheatgrass (*Agropyron cristatum*)** Forbs: bigflower agoseris (*Agoseris grandiflora*), yarrow, hawksbeard (*Crepis* spp.), hoary-aster (*Dieteria canescens*), shaggy fleabane, **prickly lettuce, tall tumblemustard, yellow salsify**
Rabbitbrush shrubland	980 (5%)	Shrubs: green rabbitbrush, rubber rabbitbrush Grasses: big bluegrass, bluebunch wheatgrass, **bulbous bluegrass, cereal rye, cheatgrass, crested wheatgrass,** Idaho fescue (*Festuca idahoensis*), needle-and-thread Forbs: Carey's balsamroot, fiddleneck, hoary-aster, lupine, **knapweed , prickly lettuce,** shaggy fleabane, **tall tumblemustard,** threadleaf fleabane (*Erigeron filifolius*), woolly plantain, yarrow, **yellow salsify**
Sagebrush shrub-steppe[2]	161 (1%)	Shrubs: big sagebrush (*Artemisia tridentata*), green rabbitbrush, rubber rabbitbrush Grasses: bluebunch wheatgrass, **bulbous bluegrass, cereal rye, cheatgrass,** needle-and-thread, Sandberg bluegrass, Forbs: Carey's balsamroot, **common stork's bill,** desert parsley (*Lomatium* sp.), fiddleneck, hoary-aster, long-leaf phlox (*Phlox longifolia*), low pussytoes (*Antennaria dimorpha*), lupine, milkvetch (*Astragalus purshii, A. spaldingii*), **prickly lettuce, Russian thistle,** sagebrush mariposa lily (*Calochortus macrocarpus* var. *macrocarpus*), shaggy fleabane, **tall tumblemustard,** wild blue flax, woolly plantain, yarrow, **yellow salsify**
Total	**18,338 (100%)[3, 4]**	

Notes:
[1] Species in **bold** are non-native.
[2] Listed as a priority habitat by the WDFW (WDFW 2008).
[3] Totals may not sum exactly due to rounding.
[4] Total does not include the 604 acres of the western solar siting areas where access was not permitted during 2021 surveys.

3.2.3.1 Agricultural Land

Areas mapped as agricultural land within the 2021 Survey Area consisted of active wheat fields and fallow wheat fields (i.e., fields in active rotation but not planted during the current season). The vast majority of the 2021 Survey Area was mapped as agricultural land (Table 2; Figure 5).

3.2.3.2 Developed/Disturbed

Developed/disturbed areas mapped within the 2021 Survey Area primarily included roads, structures and other disturbed areas associated with agricultural production, gravel piles for road repair and construction, and cell towers. The majority of the areas mapped as developed/disturbed were unvegetated or sparsely vegetated. Where present, vegetation within developed/disturbed areas was dominated by non-native invasive species such as cereal rye, cheatgrass, kochia, and prickly lettuce.

3.2.3.3 Eastside (Interior) Grassland

Eastside (interior) grassland habitat was mapped in three locations within the 2021 Survey Area. The largest of these locations was associated with the Solar Siting Area in the southeastern portion of the 2021 Survey Area. Dominant species observed in this location included the native grass needle-and-thread and the native forbs yarrow, shaggy fleabane, and lupine, as well as the non-native grasses and forbs: bulbous bluegrass, cereal rye, cheatgrass, prickly lettuce, yellow salsify, and common stork's-bill. Although rubber rabbitbrush and green rabbitbrush were observed in this area, the cover of these species was less than 5 percent. This area of eastside (interior) grassland is degraded due to the high cover of non-native species and heavy cattle grazing.

The other two locations were mapped in the central portion of the 2021 Survey Area. One of these locations consisted of a small area dominated by Great Basin wildrye along an ephemeral drainage (Attachment D, Photo 6). This area was also highly degraded due to the high cover of non-native species including cereal rye, cheatgrass, and tall tumblemustard. The third location was located on steep hillslopes along Badger Canyon. The 2018 Locust Grove Fire was mapped as overlapping a portion of this area (Figure 3; DNR 2021). Dominant species observed in this area included the native grasses and forbs: bluebunch wheatgrass and Sandberg bluegrass, Carey's balsamroot, lupine, yarrow, and Spalding's milkvetch and the non-native grasses and forbs: cheatgrass and tall tumblemustard. Although traces of rabbitbrush were observed in this area, no shrubs or seedlings of sagebrush (*Artemisia* spp.), including burned or dead sagebrush, were observed in this area (Attachment D, Photo 7). The habitat quality on the east side of Badger Canyon was higher (lower cover of non-native species, less signs of cattle grazing) than on the west side of the canyon.

3.2.3.4 Non-native Grassland

Non-native grassland habitat was commonly observed in the 2021 Survey Area. This habitat type was often observed on hillslopes and adjacent draws; however, it was also found adjacent to agricultural fields or in other flat areas where formerly planted and/or native grassland is now dominated by non-native grass and forb species. The majority of areas mapped as non-native grassland habitat consisted of vast areas dominated by dense cover of cereal rye (Attachment D, Photos 2, 3, and 8). As noted in Section 3.2.2, cereal rye is listed as a Class C noxious weed in Washington State and Benton County. Other common species observed in this habitat type include cheatgrass, prickly lettuce, tall tumblemustard, and yellow salsify. Although native forbs including yarrow, hoary-aster, and slender hareleaf (*Lagophylla ramosissima*) were occasionally observed in this habitat type, they typically represented only a small percent cover of the overall vegetative cover.

3.2.3.5 Planted Grassland

Within the 2021 Survey Area, the planted grassland habitat type consists of former agricultural lands or other disturbed areas (e.g., disturbed from wildfire) that have been planted with non-native grasses, native grasses and/or native shrubs. These areas may have been or may currently be enrolled in the Conservation Reserve Program (CRP) but their current legal status is unknown.

Areas mapped as planted grassland include areas planted with the non-native perennial grass crested wheatgrass , as well as areas planted primarily with the native perennial grasses bluebunch wheatgrass and big bluegrass. Rabbitbrush, primarily rubber rabbitbrush, was also commonly observed in this habitat type. Areas mapped as planted grassland typically contained less than approximately 10 percent cover of rabbitbrush. However, small (less than 1 acre) dense patches of rabbitbrush occur in this habitat type. Areas where high cover of rabbitbrush was observed were mapped as the rabbitbrush shrubland habitat type (see Section 3.2.3.6).

The quality of planted grassland habitat type within the 2021 Survey Area varied, with some areas of planted grassland habitat containing a higher predominance of native species such as bluebunch wheatgrass, big bluegrass, yarrow, and large-flowered agoseris and lower cover of non-native invasive species (Attachment D, Photo 10). Other areas of planted grassland habitat contain a high predominance of non-native species including the planted perennial grass crested wheatgrass and/or higher cover of non-native invasive species such as cheatgrass, cereal rye, prickly lettuce, and yellow salsify (Attachment D, Photo 11). In the western portion of the Survey Area, several areas mapped as planted grassland habitat consisted of dead and dying planted grasses (Attachment D, Photo 12). In general, planted grassland habitat contained a low diversity of forb species.

3.2.3.6 Rabbitbrush Shrubland

Rabbitbrush shrubland habitat was primarily mapped in the central and eastern portions of the 2021 Survey Area (Figure 5). Similar to the planted grassland habitat type, this habitat type was often observed in former agricultural lands or other disturbed areas (e.g., disturbed from wildfire) that appear to have been planted with non-native grasses, native grasses, and/or native shrubs (Attachment D, Photo 13). These areas may have been or may currently be enrolled in the CRP, but their current status is unknown. It is unknown whether rabbitbrush was planted in these areas or has established naturally. Rubber rabbitbrush is an early seral species that readily colonizes disturbed sites, such as areas disturbed by overgrazing or fire or abandoned agricultural lands (Faber-Langendoen et al. 2013; Tirmenstein 1999; USDA 2017). Within the 2021 Survey Area, rabbitbrush shrubland was also observed on hillslopes that are too steep for agricultural cultivation (Attachment D, Photos 14 and 15). Rabbitbrush may have colonized some of these hillslopes following past wildfires.

Shrub cover in the rabbitbrush shrubland habitat type ranged between approximately 10 to 80 percent cover, but was typically greater than 25 percent. Rubber rabbitbrush was the dominant shrub species observed, although green rabbitbrush and occasionally spineless horsebrush was also observed in this habitat type. Other common species observed in rabbitbrush shrubland habitat included the native grasses big bluegrass and bluebunch wheatgrass and the non-native grasses crested wheatgrass, cheatgrass, and cereal rye. Common forbs observed included the native forbs hoary-aster (*Dieteria canescens*), shaggy fleabane, and yarrow and the non-native forbs prickly lettuce, tall tumblemustard, and yellow salsify.

3.2.3.7 Sagebrush Shrub-steppe

Sagebrush shrub-steppe habitat was mapped in scattered locations within the 2021 Survey Area; however, it was most prevalent in the eastern portion of the survey area (Figure 5). In general, sagebrush shrub-

steppe habitat within the 2021 Survey Area was restricted to hillslopes and drainages that are too steep for agricultural production (Attachment D, Photo 16). The vast majority of sagebrush shrub-steppe habitat within the 2021 Survey Area was fragmented and highly degraded due to high cover of non-native grass and forb species and/or grazing (Attachment D, Photo 17). In a few areas mapped as sagebrush shrub-steppe, evidence of past wildfires was noted by the presence of dead shrubs (Attachment D, Photo 18).

Shrub cover in sagebrush shrub-steppe habitat type ranged between approximately 5 and 75 percent cover, but was typically less than 40 percent. The dominant shrub species in this habitat type was big sagebrush. Other shrub species commonly observed include rubber rabbitbrush and green rabbitbrush; and spineless horsebrush (*Tetradymia canescens*) and threetip sagebrush (*Artemisia tripartita*) were also observed in a few locations. Cover and diversity of grasses and forbs was variable within this habitat type; however, cover of non-native grasses including cereal rye, cheatgrass, and bulbous bluegrass was typically high. Other grasses and forbs commonly observed in sagebrush shrub-steppe habitat include the native grasses and forbs: bluebunch wheatgrass, needle-and-thread, Sandberg bluegrass, Carey's balsamroot, yarrow, long-leaf phlox, lupine, shaggy fleabane, woolly plantain , and Spalding's milkvetch, and the non-native forbs: redstem stork's bill, prickly lettuce, Russian thistle, tall tumblemustard, and yellow salsify.

4 CONCLUSIONS

Tetra Tech did not document any special status plant species within the 2021 Survey Area. Five noxious weed species were documented, several of which were abundant within the 2021 Survey Area.

Seven habitat types were mapped and characterized within the 2021 Survey Area. The vast majority (approximately 83 percent) of the 2021 Survey Area was found to consist of agricultural land. Developed/disturbed and non-native grassland accounted for approximately 6 percent of the 2021 Survey Area and eastside (interior) grassland, planted grassland, rabbitbrush shrubland, and sagebrush shrub-steppe accounted for the remaining approximately 10 percent of the 2021 Survey Area. As noted in Sections 2.1 and 3.2.3, access to two parcels totaling 604 acres within the southwestern Solar Siting Area was not permitted during the 2021 surveys. While these areas were not traversed on foot during surveys or considered part of the 2021 Survey Area, they were viewed from adjacent accessible parcels and public roads to the extent possible. Of these 604 acres, it was determined that approximately 99 percent (595 acres) of this area consists of agricultural land. In general, habitat in the vast majority of the 2021 Survey Area has been heavily modified and degraded due to historic and current agriculture and grazing activity, wildfires, and the presence of non-native, invasive plant species.

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FIGURES

Horse Heaven Wind Project

SCOUT CLEAN ENERGY

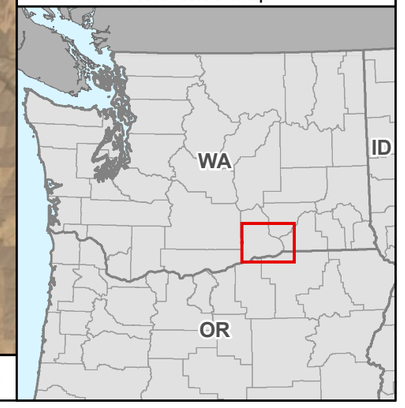
Figure 1
Project Location

BENTON COUNTY, WA

Project Lease Boundary (12/01/20)

TETRA TECH

Reference Map



Benton City
West Richland
Richland
West Pasco
Pasco
Kennewick
Prosser
Burbank
Finley
Highland
Wallula
Umatilla
Irrigon
Washington
Oregon
240
225
224
182
395
124
82
22
12
221
14
730
207

1:250,000 NAD 1983 StatePlane Washington South FIPS 4602 Feet

0 2.5 5 10 Miles

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Horse Heaven Wind Project

SCOUT CLEAN ENERGY

Figure 2
2020 and 2021 Survey Area

BENTON COUNTY, WA

- Project Lease Boundary (12/01/20)
- 2021 Survey Area
- 2020 Survey Area (Tetra Tech 2021)
- Wind Energy Micrositing Corridor (12/03/20)
- Solar Siting Area

TETRA TECH

Reference Map

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Horse Heaven Wind Project

SCOUT CLEAN ENERGY

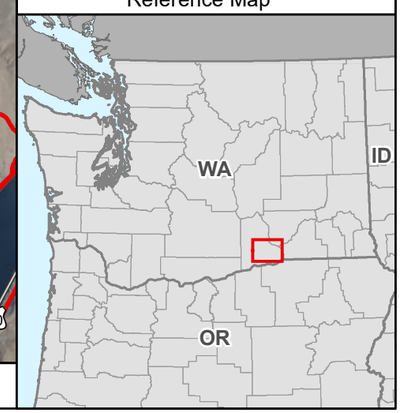
Figure 3
Fire Data

BENTON COUNTY, WA

- Project Lease Boundary (12/01/20)
- 2021 Survey Area
- Washington Large Fires 1973-2020 (DNR 2021)
- Wind Energy Micrositing Corridor (12/03/20)
- Solar Siting Area

TETRA TECH

Reference Map



MCBEE COMMAND 2016
GIBBON 2020
HORSE HEAVEN COMPLEX - MCBEE 2007
BENTON 1987
WEBER CANYON 2018
WEBBER CANYON 2016
DENNIS COMMAND 2013
DENNIS ROAD 2020
GRANDVIEW 2020
LOCUST GROVE2018
BOFFER 2018
LES BLAIR 2007
LOCUSTGROVE 1990
LES BLAIR2018
FINLEY ROAD2020
EASTERDAY2018
LES BLAIR2015
Coffin Rd
S Plymouth Rd
S Nine Canyon Rd
225
224
182
240
12
124
395
82
221
730

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Horse Heaven Wind Project

SCOUT CLEAN ENERGY

Figure 4a
Noxious Weeds

BENTON COUNTY, WA

N McBee Rd

MC Bee Rd

Beightol Rd

S Tyacke Rd

Clodius Rd

Cemetery Rd

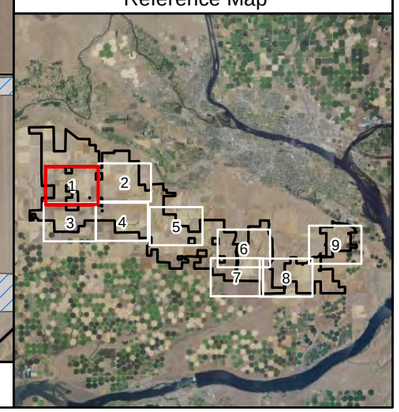
- Project Lease Boundary (12/01/20)
- 2021 Survey Area
- Micrositing Corridor (12/03/20)
- Solar Siting Area

Noxious Weed

- *Kochia scoparia* (kochia)
- *Secale cereale* (cereal rye)

TETRA TECH

Reference Map



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Horse Heaven Wind Project

SCOUT CLEAN ENERGY

Figure 4b
Noxious Weeds

BENTON COUNTY, WA

Webber Canyon Rd
Dennis Rd
Henson Rd
Swanson Rd
Travis Rd
Cemetery Rd
S Badger Canyon Rd

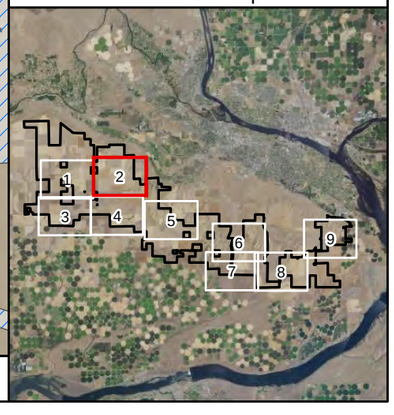
- Project Lease Boundary (12/01/20)
- 2021 Survey Area
- Micrositing Corridor (12/03/20)
- Solar Siting Area

Noxious Weed

- *Kochia scoparia* (kochia)

TETRA TECH

Reference Map



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Horse Heaven Wind Project

SCOUT CLEAN ENERGY

Figure 4c
Noxious Weeds

BENTON COUNTY, WA

C Smith Rd
Clodius Rd
Krammer Rd
Sellars Rd
S Tyacke Rd
Anderson Rd

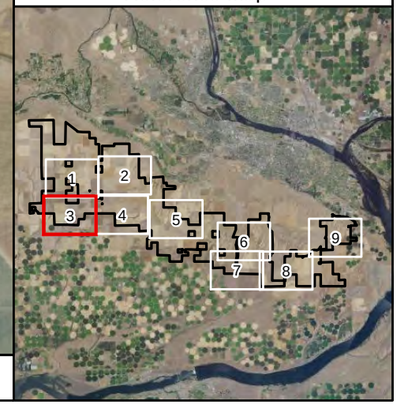
- Project Lease Boundary (12/01/20)
- 2021 Survey Area
- Micrositing Corridor (12/03/20)
- Solar Siting Area

Noxious Weed

- *Centaurea diffusa* (diffuse knapweed)
- *Chondrilla juncea* (rush skeleton weed)
- *Kochia scoparia* (kochia)
- *Secale cereale* (cereal rye)

TETRA TECH

Reference Map



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Horse Heaven Wind Project

SCOUT CLEAN ENERGY

Figure 4d
Noxious Weeds

BENTON COUNTY, WA

C Smith Rd

Travis Rd

Sellars Rd

S Badger Canyon Rd

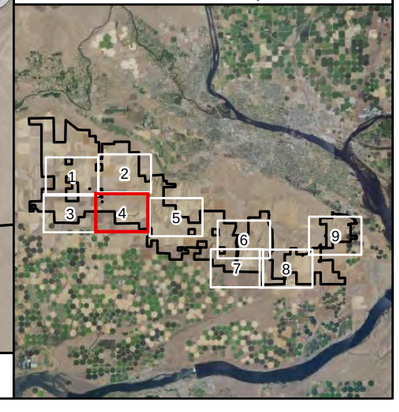
- Project Lease Boundary (12/01/20)
- 2021 Survey Area
- Micrositing Corridor (12/03/20)
- Solar Siting Area

Noxious Weed

- *Kochia scoparia* (kochia)

TETRA TECH

Reference Map



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Horse Heaven Wind Project

SCOUT CLEAN ENERGY

Figure 4e
Noxious Weeds

BENTON COUNTY, WA

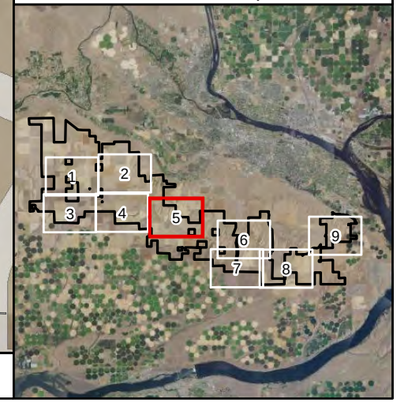
- Project Lease Boundary (12/01/20)
- 2021 Survey Area
- Micrositing Corridor (12/03/20)
- Solar Siting Area

Noxious Weed

- *Centaurea diffusa* (diffuse knapweed)
- *Chondrilla juncea* (rush skeleton weed)
- *Kochia scoparia* (kochia)

TETRA TECH

Reference Map



S Clodfelter Rd
Locust Grove Rd
Root Rd
Williams Rd
S.H. Smith Rd
Badger Cyn
Clodfelter Rd
S Plymouth Rd
Bently Rd
Richmond Rd
Coyote Canyon Rd
E Reese Rd

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Horse Heaven Wind Project

SCOUT CLEAN ENERGY

Figure 4f
Noxious Weeds

BENTON COUNTY, WA

Project Lease Boundary (12/01/20)

2021 Survey Area

Micrositing Corridor (12/03/20)

Solar Siting Area

Noxious Weed

Centaurea diffusa (diffuse knapweed)

Chondrilla juncea (rush skeleton weed)

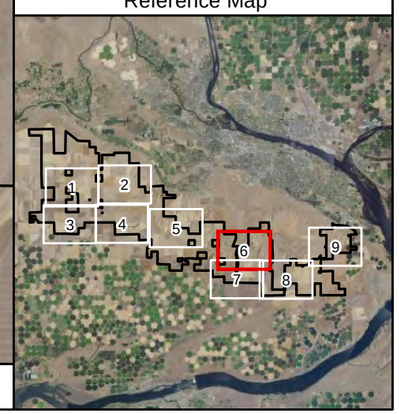
Kochia scoparia (kochia)

Onopordum acanthium (Scotch thistle)

Secale cereale (cereal rye)

TETRA TECH

Reference Map



Nicoson Rd

Johnson Butte Pr

S Owens Rd

Boiler Canyon Rd

82

1:20,000 NAD 1983 StatePlane Washington South FIPS 4602 Feet

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Horse Heaven Wind Project

SCOUT CLEAN ENERGY

Figure 4g
Noxious Weeds

BENTON COUNTY, WA

Project Lease Boundary (12/01/20)

2021 Survey Area

Micrositing Corridor (12/03/20)

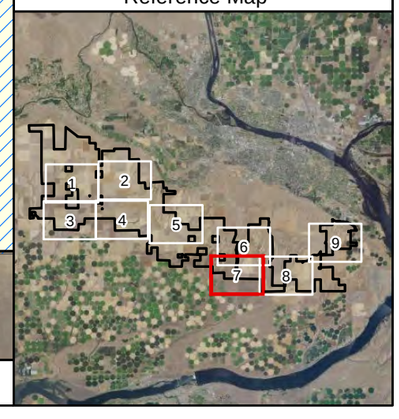
Solar Siting Area

Noxious Weed

- *Centaurea diffusa* (diffuse knapweed)
- *Chondrilla juncea* (rush skeleton weed)
- *Kochia scoparia* (kochia)
- *Onopordum acanthium* (Scotch thistle)
- *Secale cereale* (cereal rye)

TETRA TECH

Reference Map



Beck Rd

Böfer Canyon Rd

82

1:20,000 NAD 1983 StatePlane Washington South FIPS 4602 Feet

0 1,000 2,000 4,000 Feet

NOT FOR CONSTRUCTION

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Horse Heaven Wind Project

SCOUT CLEAN ENERGY

Figure 4h
Noxious Weeds

BENTON COUNTY, WA

S Owens Rd

Beck Rd

E Kirk Rd

S Nine Canyon Rd

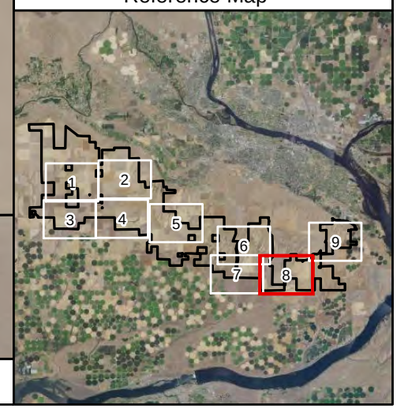
- Project Lease Boundary (12/01/20)
- 2021 Survey Area
- Micrositing Corridor (12/03/20)
- Solar Siting Area

Noxious Weed

- *Centaurea diffusa* (diffuse knapweed)
- *Chondrilla juncea* (rush skeleton weed)
- *Kochia scoparia* (kochia)
- *Secale cereale* (cereal rye)

TETRA TECH

Reference Map



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Horse Heaven Wind Project

SCOUT CLEAN ENERGY

Figure 4i
Noxious Weeds

BENTON COUNTY, WA

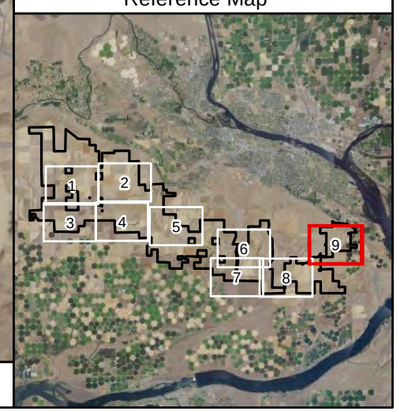
- Project Lease Boundary (12/01/20)
- 2021 Survey Area
- Micrositing Corridor (12/03/20)
- Solar Siting Area

Noxious Weed

- *Centaurea diffusa* (diffuse knapweed)
- *Chondrilla juncea* (rush skeleton weed)
- *Convolvulus arvensis* (field bindweed)
- *Kochia scoparia* (kochia)
- *Secale cereale* (cereal rye)

TETRA TECH

Reference Map



E Lower Blair Rd
S Piert Rd
S Finley Rd
S Nine Canyon Rd
S Upper Blair Rd
Mills Rd
Canyon River Rd
Albright Rd

1:20,000 NAD 1983 StatePlane Washington South FIPS 4602 Feet

0 1,000 2,000 4,000 Feet

NOT FOR CONSTRUCTION

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Horse Heaven Wind Project

SCOUT CLEAN ENERGY

Figure 5a
Habitat Mapping

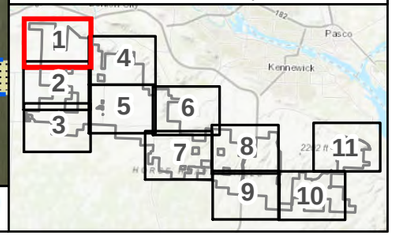
BENTON COUNTY, WA

- Project Lease Boundary
- 2021 Survey Area
- Wind Energy Micrositing Corridor
- Solar Siting Area

Habitat Types

- Agricultural land
- Developed/disturbed
- Non-native Grassland
- Planted Grassland

Reference Map



1:24,000 WGS 1984 UTM Zone 11N

0 0.25 0.5 1 1.5 2 Miles

NOT FOR CONSTRUCTION

TETRA TECH

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Horse Heaven Wind Project

SCOUT CLEAN ENERGY

Figure 5b
Habitat Mapping

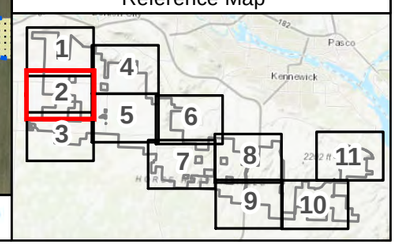
BENTON COUNTY, WA

Project Lease Boundary
2021 Survey Area
Wind Energy Micrositing Corridor
Solar Siting Area

Habitat Types

Agricultural land
Developed/disturbed
Non-native Grassland
Planted Grassland

Reference Map



1:24,000 WGS 1984 UTM Zone 11N

0 0.25 0.5 1 1.5 2 Miles

NOT FOR CONSTRUCTION

TETRA TECH

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Horse Heaven Wind Project

SCOUT CLEAN ENERGY

Figure 5c
Habitat Mapping

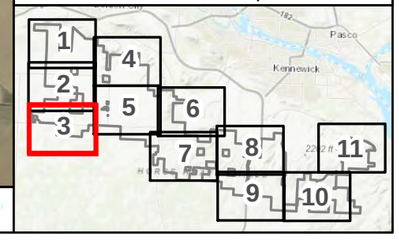
BENTON COUNTY, WA

- Project Lease Boundary
- 2021 Survey Area
- Wind Energy Micrositing Corridor
- Solar Siting Area

Habitat Types

- Agricultural land
- Developed/disturbed
- Non-native Grassland
- Planted Grassland
- Sagebrush Shrub-steppe

Reference Map



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Horse Heaven Wind Project

SCOUT CLEAN ENERGY

Figure 5d
Habitat Mapping

BENTON COUNTY, WA

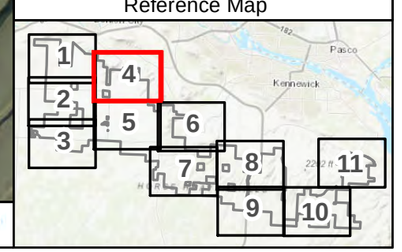
HH-West Intermediate Substation (Alternate)

Project Lease Boundary
2021 Survey Area
Wind Energy Micrositing Corridor

Habitat Types

- Agricultural land
- Developed/disturbed
- Non-native Grassland
- Sagebrush Shrub-steppe

Reference Map



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Horse Heaven Wind Project

SCOUT CLEAN ENERGY

Figure 5e
Habitat Mapping

BENTON COUNTY, WA

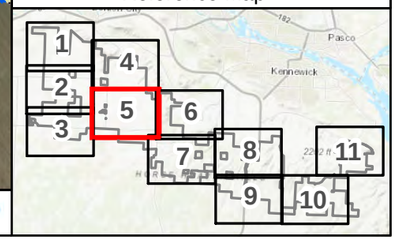
HH-West Intermediate Substation (Primary)

- Project Lease Boundary
- 2021 Survey Area
- Wind Energy Micrositing Corridor
- Solar Siting Area

Habitat Types

- Agricultural land
- Developed/disturbed
- Non-native Grassland
- Planted Grassland
- Sagebrush Shrub-steppe

Reference Map



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Horse Heaven Wind Project

SCOUT CLEAN ENERGY

Figure 5f
Habitat Mapping

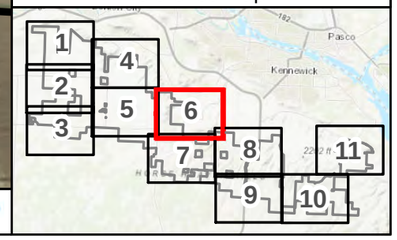
BENTON COUNTY, WA

Project Lease Boundary
2021 Survey Area
Wind Energy Micrositing Corridor

Habitat Types

- Agricultural land
- Developed/disturbed
- Eastside (Interior) Grasslands
- Non-native Grassland
- Rabbitbrush Shrubland
- Sagebrush Shrub-steppe

Reference Map



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Horse Heaven Wind Project

SCOUT CLEAN ENERGY

Figure 5g
Habitat Mapping

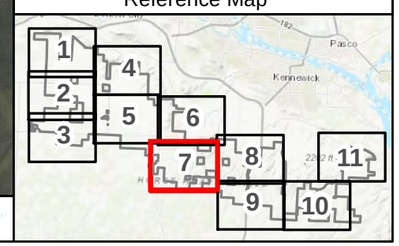
BENTON COUNTY, WA

Project Lease Boundary
2021 Survey Area
Wind Energy Micrositing Corridor

Habitat Types

- Agricultural land
- Developed/disturbed
- Eastside (Interior) Grasslands
- Non-native Grassland
- Planted Grassland
- Rabbitbrush Shrubland
- Sagebrush Shrub-steppe

Reference Map



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Horse Heaven Wind Project

SCOUT CLEAN ENERGY

Figure 5h
Habitat Mapping

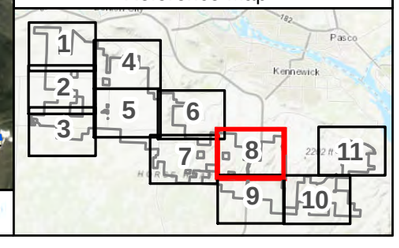
BENTON COUNTY, WA

Project Lease Boundary
2021 Survey Area
Wind Energy Micrositing Corridor

Habitat Types

- Agricultural land
- Developed/disturbed
- Non-native Grassland
- Planted Grassland
- Rabbitbrush Shrubland
- Sagebrush Shrub-steppe

Reference Map



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Horse Heaven Wind Project

SCOUT CLEAN ENERGY

Figure 5i
Habitat Mapping

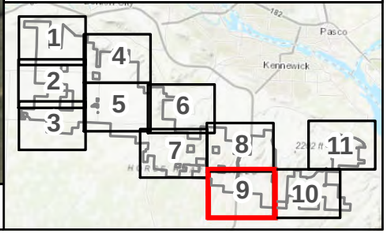
BENTON COUNTY, WA

Project Lease Boundary
2021 Survey Area
Wind Energy Micrositing Corridor
Solar Siting Area

Habitat Types

- Agricultural land
- Developed/disturbed
- Eastside (Interior) Grasslands
- Non-native Grassland
- Planted Grassland
- Rabbitbrush Shrubland
- Sagebrush Shrub-steppe

Reference Map



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Horse Heaven Wind Project

SCOUT CLEAN ENERGY

Figure 5j
Habitat Mapping

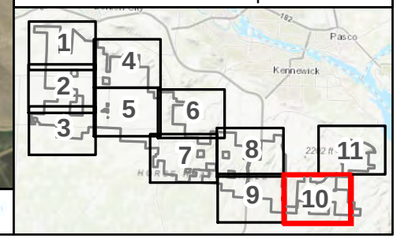
BENTON COUNTY, WA

- Project Lease Boundary
- 2021 Survey Area
- Wind Energy Micrositing Corridor
- Solar Siting Area

Habitat Types

- Agricultural land
- Developed/disturbed
- Non-native Grassland
- Planted Grassland
- Rabbitbrush Shrubland
- Sagebrush Shrub-steppe

Reference Map



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Horse Heaven Wind Project

SCOUT CLEAN ENERGY

Figure 5k
Habitat Mapping

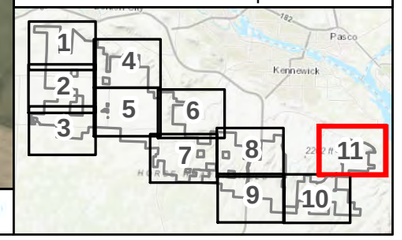
BENTON COUNTY, WA

Project Lease Boundary
2021 Survey Area
Wind Energy Micrositing Corridor

Habitat Types

- Agricultural land
- Developed/disturbed
- Non-native Grassland
- Planted Grassland
- Rabbitbrush Shrubland
- Sagebrush Shrub-steppe

Reference Map



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ATTACHMENT A
SPECIAL STATUS PLANT SPECIES WITH POTENTIAL TO OCCUR WITHIN THE 2021 SURVEY AREA

Table A-1. Special Status Plant Species with Potential to Occur within the 2021 Survey Area[1]

Scientific name (Common Name)	State Status / Federal Status[2]	Habitat Characteristics/ Identifying Features[3]	Survey Period[4]	Likelihood of Occurrence Based on Background Review	Suitable Habitat Present Based on Field Surveys
Aliciella leptomeria (Great Basin gilia)	T / --	Open habitats in semiarid regions, on dry bluffs or in sandy swales. Substrates are often hard, gravelly or sandy, fine reddish to blackish basalt soils, or fine non-basalt gravel with caliche fragments. Associated species include: *Artemisia tridentata, Grayia spinosa*, and *Gilia sinuata*. Elev. 470–1,140 feet.	April–June	Low; limited suitable habitat likely present in 2021 Survey Area.	Limited suitable habitat present
Ammania robusta (grand redstem)	T / --	Shoreline and islands along the Columbia River, in riparian mudflats dominated by annual species. Also known from lakeshores in the channeled scablands. Sites are inundated until midsummer and periodically throughout the growing season, depending on upstream management of the river. Associated species include *Rotala ramosior, Eleocharis acicularis, Cyperus* spp., *Limosella aquatica, Lindernia dubia*, and occasionally *Rorippa columbiae*.	May–June	Highly unlikely; suitable habitat unlikely to occur within 2021 Survey Area.	No suitable habitat present
Astragalus columbianus (Columbian milkvetch)	S / --	Shrub-steppe habitats on sandy or gravelly loams, silts, rocky silt loams, and lithosols. Associated species include: *Artemisia tridentata, A. rigida, Pseudoroegneria spicata, Astragalus caricinus, A. purshii, A. speirocarpus*, and *A. succumbens*. Elev. 420–2,320 feet.	Mid-April–mid-June	Low to moderate; suitable habitat potentially present in 2021 Survey Area.	Limited suitable habitat present
Astragalus kentrophyta var. *douglasii* (thistle milkvetch)	X / --	On sandy ground, dunes, or eroded riverbanks at low elevations. Not seen since 1883; this taxon is likely extinct.	June	Highly unlikely; species is believed to be extirpated in Washington.	No suitable habitat present
Astragalus misellus var. *pauper* (pauper milk-vetch)	S / --	Open ridgetops and upper slopes, rarely middle and lower slopes, along western margin of the Columbia Basin province. In *Artemisia tridentata/ Pseudoroegneria spicata* vegetation community. Associated species include: *Artemisia rigida, A. tridentata, Crepis atribarba, C. occidentalis, Eriogonum sphaerocephalum, Pseudoroegneria spicata, Poa secunda, Astragalus purshii., Erigeron linearis, Lomatium macrocarpum, Phlox longifolia*, and *P. hoodii*. Elev. 500–3,280 feet.	April–June	Highly unlikely; known occurrences in Benton County are historical occurrences.[5]	Very limited suitable habitat present

Scientific name (Common Name)	State Status / Federal Status[2]	Habitat Characteristics/ Identifying Features[3]	Survey Period[4]	Likelihood of Occurrence Based on Background Review	Suitable Habitat Present Based on Field Surveys
Calyptridium roseum (rosy pussypaws)	T / --	Sagebrush desert to arid montane forest, in sandy to gravelly soils. In Washington, grows in very dry shrub-steppe, in low swales in dark sandy soil. In spring, the swale microsites may be moister than the surrounding habitat. Associated species include: *Artemisia tridentata, Bromus tectorum, Poa secunda, Greeneocharis circumscissa, Holosteum umbellatum, Draba verna, Erythranthe suksdorfii, Microsteris gracilis, Loeflingia squarrosa* subsp. *squarrosa*, and *Gilia leptomeria*. Elev. 525 feet.	May–June	Low to moderate; suitable habitat potentially present in 2021 Survey Area.	Limited suitable habitat present
Cryptantha leucophaea (gray cryptantha)	T / --	Sandy substrates, especially sand dunes that have not been completely stabilized. Appears to be restricted to areas where there is still some wind-derived movement of open sand. Associated species include: *Purshia tridentata, Artemisia tridentata, Hesperostipa comata, Achnatherum hymenoides, Poa secunda, Oenothera pallida, Eriogonum niveum, Penstemon attenuatus,* and *Astragalus succumbens*. Elev. 300–2,500 feet.	May–June	Low; limited suitable habitat likely present in 2021 Survey Area.	Very limited suitable habitat present
Cryptantha scoparia (desert cryptantha)	S / --	Dry areas with full sun and little competing vegetation. In Washington, grows on south-facing slopes and ridges between small canyons with fine, dry silt and talus. Sites may be a little more alkaline than surrounding areas. Associated species include: *Artemisia tridentata, Krascheninnikovia lanata, Eriogonum niveum, Eriophyllum lanatum, Epilobium minutum, Bromus hordeaceus, Bromus tectorum*, and *Pseudoroegneria spicata*. Elev. 1,200–2,100 feet.	April–June	Low; limited suitable habitat likely present in 2021 Survey Area.	No suitable habitat present
Cryptantha spiculifera (Snake River cryptantha)	S / --	Sandy knolls and badlands and talus at low elevations; dry, open, flat or sloping areas in stable or stony soils. Associated species include: *Artemisia rigida, A. tridentata, Ericameria nauseosa, Eriogonum sphaerocephalum, Salvia dorrii, Lupinus sericeus, Pseudoroegneria spicata*, and *Poa secunda*. Elev. 450–3,500 feet.	May–July	Low; limited suitable habitat likely present in 2021 Survey Area.	Very limited suitable habitat present
Cuscuta denticulata (desert dodder)	T / --	Parasitic on a variety of native shrubs in desert areas, including sagebrush (Artemisia spp.), rabbitbrush (Chrysothamnus/Ericameria spp.). Associated species include: *Artemisia tridentata, Poa secunda, Achnatherum hymenoides, Bromus tectorum, Astragalus caricinus, Erigeron poliospermus, Cymopterus terebinthinus*, and *Helianthus cusickii*. Elev. 880–1,089 feet.	July–August	Highly unlikely; known occurrences in Benton County are historical occurrences[5].	Limited suitable habitat present

Scientific name (Common Name)	State Status / Federal Status[2]	Habitat Characteristics/ Identifying Features[3]	Survey Period[4]	Likelihood of Occurrence Based on Background Review	Suitable Habitat Present Based on Field Surveys
Eleocharis coloradoensis (dwarf spike-rush)	X / --	Fresh to brackish bare wet soil, inland. Fresh or brackish drying lake and pond margins, stream beds, flood plains, vernal pools, irrigation ditches, tidal wetlands. Elev. 0–6,900 feet.	Spring–fall	Highly unlikely; species is believed to be extirpated in Washington.	No suitable habitat present
Eremogone franklinii var. *thompsonii* (Thompson's sandwort)	S / --	Sand dunes, scabland, and sagebrush slopes. Associated species include: *Purshia tridentata, Poa canbyi* and other bunchgrasses.	May–June	Low; limited suitable habitat likely present in 2021 Survey Area.	Very limited suitable habitat present
Eremothera minor (small-flower evening-primrose)	S / --	Gravelly basalt slopes, sandy and alkaline soils, and dry rocky hillsides; often with considerable cover of bare soil. Associated species include: *Artemisia tridentata, Ericameria nauseosa, Purshia tridentata, Bromus tectorum*, and *Poa secunda*. Elev. 460–1,140 feet.	May–early June	Low; limited suitable habitat likely present within 2021 Survey Area.	Very limited suitable habitat present
Eremothera pygmaea (dwarf evening-primrose)	S / --	Sagebrush steppe, on unstable soil or gravel in steep talus, dry washes, banks, and roadcuts. Associated species include: *Artemisia tridentata, Bromus tectorum, Eriogonum* spp., *Gilia minutiflora, Mentzelia* spp., *Cryptantha* spp., *Salsola tragus*, and *Neoholmgrenia* (*Camissonia*) *andina*. Elev. 450–2,050 feet.	Flowers April–June; Fruits June –August	Low; limited suitable habitat likely present within 2021 Survey Area.	Very limited suitable habitat present
Eriogonum codium (Umtanum desert buckwheat)	E / T	Known from one population on flat to gently sloping microsistes near the top of a steep, north-facing basalt ridge overlooking the Columbia River. Overall vegetation cover is low. Associated species include: *Grayia spinosa, Salvia dorrii, Bromus tectorum, Camissonia minor, Cryptantha pterocarya, and Phacelia linearis.* Elev. 1,120–1,300 feet.	May–August	Highly unlikely, only known population is located more than 25 miles north of 2021 Survey Area.	No suitable habitat present
Erythranthe suksdorfii (Suksdorf's monkeyflower)	S / --	Open, moist, or rather dry places, from the valleys and foothills to moderate or occasionally high elevations in the mountains. Occurs in seasonally moist swales, drainages, or vernal pools in shrub-steppe vegetation. Microhabitats are often disturbed by small erosive events (i.e., slumps, slides, bioturbidity, and frost boils). Associated species include: *Juniperus communis. Philadelphus lewisii, Artemisia tridentata, Eriogonum* sp., *Bromus tectorum, Poa secunda, Camissonia hilgardii, Collomia linearis, Draba verna, Erythranthe floribunda, E. breviflora, Plectritis macrocera, Cryptantha ambigua, Microsteris gracilis*, and *Ranunculus testiculatus*. Elev. 430–7,100 feet.	mid-April–approx. June	Low; limited suitable habitat likely to occur within 2021 Survey Area.	No suitable habitat present

Scientific name (Common Name)	State Status / Federal Status[2]	Habitat Characteristics/ Identifying Features[3]	Survey Period[4]	Likelihood of Occurrence Based on Background Review	Suitable Habitat Present Based on Field Surveys
Hypericum majus (Canadian St. John's-wort)	S / --	Along ponds, lakesides, riparian habitats, or other low, wet places (FACW species). In Washington, it occurs in habitats that are completely submerged during portions of the growing season or periodically inundated from water controlled by hydroelectric dams. Associated species include: *Equisetum* spp., *Juncus bufonius, J. tenuis, J. articulatus,* and *Carex* spp. Elev. 50–2,340 feet.	July–September	Highly unlikely; suitable habitat unlikely to occur within 2021 Survey Area.	No suitable habitat present
Leymus flavescens (yellow wildrye)	S / --	Occurs in sandy soils throughout its range. In Montana it is found in sand-deposition areas of sand dunes, where it is associated with *Hesperostipa comata* and *Elymus caninus*. The species has also been found on sandy roadsides.	June–July	Highly unlikely; known occurrence in Benton County is a historical occurrence[5].	No suitable habitat present
Lipocarpha aristulata (awned halfchaff sedge)	T / --	Wet soil and mud, often comprised of fine sand and silt, in bottomlands, sandbars, beaches, shorelines, stream banks, ponds, and ditches. In WA, grows along shorelines and islands below high water at elevations up to 500 feet. Associated species include: *Eleocharis* spp., *Juncus* spp., *Ammannia robusta*, *Rotala ramosior*, *Cyperus* spp., *Limosella* spp., *Lindernia dubia*, and *Rorippa columbiae*.	June–August	Highly unlikely; suitable habitat unlikely to occur within 2021 Survey Area.	No suitable habitat present
Loeflingia squarrosa (spreading pygmyleaf)	T / --	Low swales and shallow vernal pools in sandy and silty areas. The Washington populations were found during an unusually wet year in swales and vernally wet areas with a great diversity of annuals in an otherwise arid environment. Associated species include: *Artemisia tridentata, Poa secuda, Greeneocharis circumscissa, Erythranthe suksdorfii, Holosteum umbellatum, Microsteris gracilis, Gnaphalium palustre, Epilobium minutum, Gilia sinuata*, and *Juncus bufonius*. Elev. 430–580 feet.	May	Highly unlikely; suitable habitat unlikely to occur within 2021 Survey Area.	No suitable habitat present
Lomatium tuberosum (Hoover's desert-parsley)	S / --	Loose basalt talus in sagebrush steppe, typically on east- to north-facing slopes. Sometimes in channels of open ridgetops and talus on south- to southwest-facing slopes in the western portion of its distribution. Associated species include: *Artemisia rigida, Poa secunda, Pseudoroegneria spicata*, and *Delphinium nuttalianum*. Elev. 460–4,000 feet.	Early March–mid-April	Low; limited suitable habitat likely present within 2021 Survey Area.	No suitable habitat present

Scientific name (Common Name)	State Status / Federal Status[2]	Habitat Characteristics/ Identifying Features[3]	Survey Period[4]	Likelihood of Occurrence Based on Background Review	Suitable Habitat Present Based on Field Surveys
Micromonolepis pusilla (red poverty-weed)	T / --	Desert regions, in saline or alkaline clay soils, salt-encrusted soils, or edges of alkaline ponds. This species is adapted to extreme conditions. In some sites it is limited to growing directly beneath greasewood shrubs, due to cattle trampling and soil compaction between the shrubs. Associated species include: *Sarcobatus vermiculatus, Suaeda depressa, Bromus tectorum*, and *Phacelia tetramera*. Elev. 1,950–2,210 feet.	April–June	Highly unlikely; suitable habitat unlikely to occur within survey area and known occurrence in Benton County is historical occurrence[5].	No suitable habitat present
Mimetanthe pilosa (false monkeyflower)	S / --	Moist, sandy or gravelly soils, especially by small streams, seeps, springs, and disturbed areas. Elev. 1,000–4,500 feet.	May–July	Highly unlikely; known occurrence in Benton County is a historical occurrence[5].	No suitable habitat present
Myosurus alopecuroides (foxtail mousetail)	T / --	Obligate vernal pool species; found on hard, bare, desiccated clay in sparsely vegetated areas of shallow pools. Associated species include: *Deschampsia danthonioides, Myosurus minimus, Navarretia leucocephala, Plagiobothrys* spp., and *Polygonum polygaloides* ssp. *confertiflorum*. Elev. 250–2,500 feet.	March–June	Highly unlikely; suitable habitat unlikely to occur within 2021 Survey Area.	No suitable habitat present
Nicotiana attenuata (coyote tobacco)	S / --	Dry, sandy bottom lands, dry rocky washes, and in other dry open places; Elev. 320 to 2,640 feet. Associated species: *Artemisia tridentata, Ericameria* spp., *Bromus tectorum, Leymus cinereus, Centaurea diffusa, Verbascum thapsus, Solanum triflorum, Achillea millefolium,* and *Mentzelia laevicaulis*.	June–September	Low; limited suitable habitat likely to occur in 2021 Survey Area.	Very limited suitable habitat present
Oenothera cespitosa ssp. *cespitosa* (cespitose evening-primrose)	S / --	Open sagebrush desert; on loose talus slopes, steep, sandy or gravelly slopes, road cuts, and dry hills; as well as along the flat river terrace of the Columbia River. It occurs within general areas dominated by *Artemisia tridentata* or *Artemisia rigida*. Other associated species include: *Ericameria nauseosa, Eriogonum douglasii* and *E. niveum*, *Poa secunda, Achnatherum thurberianum, A. hymenoides, Hesperostipa comata, Koeleria macrantha, Astragalus purshii, A. succumbens, Balsamorhiza careyana, Phacelia hastata*, and *Cymopterus terebinthina*. Elev. 410–1,800 feet.	Late-April–mid-June	Moderate; suitable habitat potentially present in 2021 Survey Area.	Limited suitable habitat present

Scientific name (Common Name)	State Status / Federal Status[2]	Habitat Characteristics/ Identifying Features[3]	Survey Period[4]	Likelihood of Occurrence Based on Background Review	Suitable Habitat Present Based on Field Surveys
Rorippa columbiae (Columbia yellowcress)	T / --	Riverbanks, permanent lakes, snow-fed lakes, and streams, internally-drained lakes with extended periods of dryness, wet meadows, and ditches. All known sites are inundated for at least part of the year. Soil types include clay, sand, gravel, sandy silt, cobblestones, and rocks. All sites in Washington occur along the Columbia River, in the lowest vegetated riparian zone.	April–October	Highly unlikely; suitable habitat unlikely to occur within 2021 Survey Area.	No suitable habitat present
Rotala ramosior (lowland toothcup)	S / --	Damp areas in fine sand and silt, wet, swampy places, mudflats, lakes and pond margins, and along free-flowing river reaches. Found in riparian wetlands growing below high water, often in a community of small emergent annuals. Elev. 200 to 2,260 feet. Associated species include: *Salix exigua, Ammannia robusta, Juncus* spp., *Eleocharis acicularis, Limosella acaulis, Lindernia dubia*, and *Cyperus acuminatus*. Elev. 200–2,259 feet.	June–August	Highly unlikely; suitable habitat unlikely to occur within 2021 Survey Area.	No suitable habitat present
Sabulina nuttallii var. *fragilis* (Nuttall's sandwort)	T / --	Open, gravelly benches, dry rocky areas, or limestone talus from open sagebrush hills to alpine slopes. In Washington this taxon has been found on desert ridges of raised basalt, talus, outcrops, and in rocky to gravelly or sandy soil. Associated species include: *Purshia tridentata, Grayia spinosa, Salvia dorrii, Pseudoroegneria spicata, Ericameria nauseosa, Eriogonum microthecum, Balsamorhiza careyana*, and *Lomatium macrocarpum*.	May–August	Highly unlikely; suitable habitat unlikely to occur within 2021 Survey Area.	No suitable habitat present

Notes:

[1] Table based on the WNHP's Rare Vascular and Nonvascular Species List for Benton County (WNHP 2021a)

[2] State Status: WNHP (2019) provides the following explanation of state status:

E = Endangered, in danger of becoming extinct or extirpated from Washington
T = Threatened, likely to become Endangered in Washington
S = Sensitive, vulnerable or declining and could become Endangered or Threatened in Washington
X = Possibly extinct or extirpated from Washington State (includes state historical species).

Federal status: T = Listed threatened.

[3] Sources: Burke Museum of Natural History and Culture 2021; Hitchcock and Cronquist 2018; WNHP 2019, 2021b.

[4] Sources: Burke Museum of Natural History and Culture 2021; WNHP 2021b.

[5] Historical occurrence is one that has not been reconfirmed for 40 or more years, or the species is extirpated from the county (WNHP 2021a).

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ATTACHMENT B
VASCULAR PLANTS OBSERVED WITHIN THE 2021 SURVEY AREA

Scientific Name	Common Name	Family	Type	Non-native	Noxious Weed Class Benton County / Washington State	Synonyms / Notes
Achillea millefolium	common yarrow	Asteraceae	forb			
Achnatherum hymenoides	Indian rice grass	Poaceae	grass			
Agoseris grandiflora	bigflower agoseris	Asteraceae	forb			
Agoseris heterophylla	annual agoseris	Asteraceae	forb			
Agropyron cristatum	crested wheatgrass	Poaceae	grass	x		
Allium acuminatum	tapertip onion	Amaryllidaceae	forb			
Amaranthus blitoides	matweed, prostrate pigweed	Amaranthaceae	forb	x		
Ambrosia acanthicarpa	bur ragweed	Asteraceae	forb			
Amsinckia lycopsoides	tarweed fiddleneck, bugloss fiddleneck	Boraginaceae	forb			
Amsinckia tessellata	bristly fiddleneck, tessellate fiddleneck	Boraginaceae	forb			
Antennaria dimorpha	low pussytoes	Asteraceae	forb			
Artemisia dracunculus	dragon sagewort, tarragon, dragon wormwood	Asteraceae	forb			
Artemisia tridentata	big sagebrush	Asteraceae	shrub			
Artemisia tripartita	threetip sagebrush	Asteraceae	shrub			
Astragalus purshii	woollypod milkvetch, Pursh's milk-vetch	Fabaceae	forb			
Astragalus spaldingii	Spalding's milkvetch	Fabaceae	forb			
Balsamorhiza careyana	Carey's balsamroot	Asteraceae	forb			
Bassia scoparia	red belvedere, mock cypress, kochia	Amaranthaceae	forb	x	Class B / Class B	*Kochia scoparia*
Bromus arvensis	field brome/Japanese brome	Poaceae	grass	x		*Bromus japonicus*
Bromus hordeaceus	soft brome	Poaceae	grass	x		*Bromus mollis*
Bromus tectorum	cheatgrass	Poaceae	grass	x		
Calochortus macrocarpus var. *macrocarpus*	sagebrush mariposa lily	Liliaceae	forb			
Centaurea sp.	knapweed	Asteraceae	forb	x	Class B / Class B	likely diffuse knapweed
Ceratocephala testiculata	burr buttercup	Ranunculaceae	forb	x		
Chaenactis douglasii	Douglas' dustymaiden, dusty maidens	Asteraceae	forb			
Chenopodium leptophyllum	narrowleaf goosefoot	Amaranthaceae	forb			
Chondrilla juncea	rush skeletonweed	Asteraceae	forb	x	Class B / Class B	
Chorispora tenella	crossflower, blue mustard	Brassicaceae	forb	x		
Chrysothamnus viscidiflorus	yellow rabbitbrush, green rabbitbrush	Asteraceae	shrub			
Convolvulus arvensis	field bindweed	Convolvulaceae	forb	x	Class C / Class C	
Conyza canadensis	horseweed, Canadian fleabane	Asteraceae	forb			
Crepis atribarba	slender hawksbeard	Asteraceae	forb			
Crepis intermedia	intermediate hawksbeard, limestone hawksbeard	Asteraceae	forb			
Cymopterus terebinthinus	turpentine spring parsley, turpentine wavewing	Apiaceae	forb			*Pteryxia terebinthina*
Descurainia pinnata	western tansymustard	Brassicaceae	forb			
Descurainia sophia	flixweed	Brassicaceae	forb	x		
Dieteria canescens	hoary-aster	Asteraceae	forb			*Machaeranthera canescens*
Draba verna	spring whitlow-grass	Brassicaceae	forb	x		
Elymus elymoides	squirreltail	Poaceae	grass			
Epilobium brachycarpum	tall annual willowherb	Onagraceae	forb			
Ericameria nauseosa	rubber rabbitbrush, gray rabbitbrush	Asteraceae	shrub			
Erigeron filifolius	threadleaf fleabane	Asteraceae	forb			
Erigeron linearis	desert yellow daisy, lineleaf fleabane	Asteraceae	forb			
Erigeron pumilus	shaggy fleabane	Asteraceae	forb			
Eriophyllum lanatum var. *integrifolium*	Oregon sunshine	Asteraceae	forb			
Erodium cicutarium	redstem, common stork's bill, crane's-bill	Geraniaceae	forb	x		
Grayia spinosa	spiny hopsage	Amaranthaceae	shrub			
Hesperostipa comata	needle-and-thread grass	Poaceae	grass			
Heterotheca villosa	hairy goldaster	Asteraceae	forb			
Holosteum umbellatum	jagged chickweed	Caryophyllaceae	forb	x		
Hordeum murinum	mouse barley	Poaceae	grass	x		
Lactuca serriola	prickly lettuce	Asteraceae	forb	x		
Lagophylla ramosissima	slender hareleaf, branched lagophylla	Asteraceae	forb			
Lappula longispina	long-spined stickseed	Boraginaceae	forb	x		

Scientific Name	Common Name	Family	Type	Non-native	Noxious Weed Class Benton County / Washington State	Synonyms / Notes
Leymus cinereus	basin wildrye	Poaceae	grass			*Elymus cinereus*
Linum lewisii var. *lewisii*	wild blue flax, prairie flax	Linaceae	forb			
Lithospermum ruderale	western gromwell, western stoneseed	Boraginaceae	forb			
Lomatium macrocarpum	large-fruit desert-parsley, bigseed lomatium	Apiaceae	forb			
Lomatium papilioniferum	butterbly bearing biscuit-root	Apiaceae	forb			*Lomatium grayi*
Lomatium triternatum	triternate biscuit-root	Apiaceae	forb			
Lupinus leucophyllus	velvet lupine	Fabaceae	forb			
Lupinus sulphureus var. *subsaccatus*	sulphur lupine, Bingen lupine	Fabaceae	forb			
Madia sp.	tarweed	Asteraceae	forb			
Mentzelia albicaulis	white-stem blazingstar	Loasaceae	forb			
Onopordum acanthium	Scotch thistle	Asteraceae	forb	x	Class B / Class B	
Phacelia linearis	thread-leaf phacelia, thread-leaf scorpion-weed	Hydrophyllaceae	forb			
Phlox longifolia	long-leaf phlox	Polemoniaceae	forb			
Phlox sp.	phlox	Polemoniaceae	forb			
Plantago patagonica	woolly plantain, indianwheat plantain	Plantaginaceae	forb			
Poa bulbosa	bulbous bluegrass	Poaceae	grass	x		
Poa secunda ssp. *juncifolia*	big bluegrass, Nevada bluegrass, alkali bluegrass	Poaceae	grass			*Poa ampla*
Poa secunda ssp. *secunda*	Sandberg bluegrass, curly bluegrass	Poaceae	grass			
Polygonum aviculare	prostrate knotweed	Polygonaceae	forb	x		
Polypogon monspeliensis	annual rabbit's-foot grass	Poaceae	grass	x		
Pseudoroegneria spicata	bluebunch wheatgrass	Poaceae	grass			
Robinia pseudoacacia	black locust	Fabaceae	tree	x		
Salsola tragus	prickly Russian thistle	Chenopodiaceae	forb	x		*Salsola kali*
Secale cereale	cereal rye	Poaceae	grass	x	Class C / Class C	
Sisymbrium altissimum	tall tumblemustard	Brassicaceae	forb	x		
Stephanomeria tenuifolia	wire lettuce, narrowleaf wirelettuce	Asteraceae	forb			
Taraxacum officinale	common dandelion	Asteraceae	forb	x		
Tetradymia canescens	gray horsebrush, spineless horsebrush	Asteraceae	shrub			
Tragopogon dubius	yellow salsify	Asteraceae	forb	x		
Triticum aestivum	wheat	Poaceae	grass	x		
Verbena bracteata	carpet vervain	Verbenaceae	forb			
Vulpia bromoides	brome fescue	Poaceae	grass	x		
Vulpia microstachys	small fescue	Poaceae	grass			

ATTACHMENT C
WOVEN-SPORE LICHEN HABITAT SUITABILITY ASSESSMENT

1 INTRODUCTION

Based on review of the Washington Natural Heritage Program (WNHP) data (WNHP 2021a, 2021b), one special status non-vascular species, woven-spore lichen (*Texosporium sancti-jacobi*), was identified as occurring in Benton County and potentially within the Project Lease Boundary. In Washington, this species has been assigned the rank of threatened by the WNHP (WNHP 2021a). Woven spore-lichen has been documented at four separate locations within approximately 3 miles of the Project Lease Boundary, with the closest occurrence approximately 0.4 mile to the north. Field surveys for woven-spore lichen have not been conducted for the Project. In lieu of field surveys, this habitat suitability assessment was conducted to identify potentially suitable habitat at the Project for this species.

2 BACKGROUND

Woven spore lichen is a crustose lichen in the Caliciaceae (pin lichen) family of the Fungi Kingdom. It is identified by its whitish-margined apothecia (spore-bearing structure or fruiting body) and dark olive, loose spore mass (WNHP 2021c). In Washington, this species is currently known from Benton, Klickitat, Lincoln, and Yakima counties (Stone et al. 2018).

Habitat for this species includes arid to semiarid shrub-steppe, grassland, biscuit scabland, or savannah communities up to 3,300 feet in elevation (WNHP 2021c). Woven-spore lichen is typically found in areas of non-saline and noncalcerous soils on flat to gentle slopes, although it has also been found on slopes of up to 15 percent (Root and McCune 2012; Stone et al. 2018; WNHP 2021c). Most sites where it is found are relatively undisturbed and dominated by native plants, including sagebrush (*Artemisia tridentata*), bitterbrush (*Purshia tridentata),* Idaho fescue (*Festuca idahoensis*), and bluebunch wheatgrass (*Pseudoroegneria spicata*) and are influenced by moisture from a river or lake (Root and McCune 2012; Stone et al. 2018; WNHP 2021c). It is often found on decomposing bunchgrass clumps that are impregnated with soil but elevated above the surrounding surface, on well-developed pinnacles of soil, or on old, decaying mammal scat (Stone et al. 2018; WNHP 2021c).

In 2018, surveys for woven-spore lichen were conducted for the Bureau of Land Management (BLM) in various locations on BLM-managed land in Lincoln, Grant, Yakima, and Benton counties (Stone et al. 2018). These surveys included BLM-managed land in the Horse Heaven Hills. During these surveys, woven-spore lichen was found in the Horse Heaven Hills in areas dominated by native bunchgrasses including bluebunch wheatgrass (*Pseudoroegneria spicata*) and Sandberg bluegrass (*Poa secunda* ssp. *secunda*) and lacking a shrub component (Stone et al. 2018). Although the areas where woven-spore lichen was most observed to be most abundant during these surveys had high cover of native plants, some areas had significant cover of invasive annual *Bromus* species and other non-native species (Stone et al. 2018). However, the ability to tolerate invasive grasses may be restricted to relatively moist habitats, such as those in proximity to rivers (Root and McCune 2012; Stone et al 2018).

Woven-spore lichen appears to be intolerant of disturbance such as livestock grazing, and fire generally eliminates the species (McCune and Rosentreter 1992; Stone et al. 2018; WNHP 2021c). Vegetation communities where this species is typically found are considered late-successional due to the lack of disturbance for 20 years or more (McCune and Rosentreter 1992).

3 METHODS – HABITAT SUITABILITY ASSESSMENT

Based on the habitat requirements noted above and the results of habitat and botanical field surveys conducted in 2020 (Tetra Tech 2021) and 2021 (this report), Tetra Tech performed a habitat suitability assessment to determine whether potential suitable habitat for woven-spore lichen may occur within the Project Wind Energy Micrositing Corridor and Solar Siting Areas and, therefore, whether this species could potentially be impacted by the Project.

During field surveys in 2020 and 2021, Tetra Tech mapped eight habitat types within the Wind Energy Micrositing Corridor and Solar Siting Areas. Of these eight, five habitat types were removed from consideration as potential habitat for woven-spore lichen: agricultural land, developed/disturbed, non-native grassland, planted grassland, and rabbitbrush shrubland. Agricultural land, developed/disturbed, and non-native grassland habitat types were removed from consideration because these habitat types undergo continual disturbance and are dominated by non-native plant species. Although in some areas within the Wind Energy Micrositing Corridor and Solar Siting Areas, the planted grassland and rabbitbrush shrubland habitat types contained relatively high cover of native species, these two habitat types were excluded from the assessment because 1) they are not considered late-successional vegetation communities and 2) they have undergone repeated disturbance (e.g., agricultural production, planting of grasses and/or shrubs) in the past 20 years. Planted grasslands, and often rabbitbrush shrubland, within the Micrositing Corridor and Solar Siting Areas are generally located on former agricultural lands or other disturbed areas (e.g., areas disturbed by wildfire) that have been planted with non-native and/or native grasses. As discussed in Section 3.2.3.6 of this report, rabbitbrush shrubland was also mapped on hillslopes unlikely to have been previously cultivated for agriculture. These areas were also removed from consideration as these areas occur on slopes greater than 15 percent or contained high cover of non-native invasive grasses and forbs.

The remaining three habitat types—dwarf shrub-steppe, sagebrush shrub-steppe, and eastside (interior) grassland—were evaluated for their potential to provide suitable habitat for woven-spore lichen. To determine suitability, the following habitat factors, per McCune and Rosentreter (1992), Root and McCune (2012), Stone et al. (2018), and WNHP (2021c), were considered:

- Dominance of native species
- Presence of disturbance – i.e., past wildfires, heavy livestock grazing, presence of invasive species
- Percent slope – i.e., slopes greater than 15 percent were removed from analysis
- Proximity to a waterbody (e.g., river or drainage)

Table C-1 provides the habitat suitability criteria that was used to determine areas of dwarf shrub-steppe, sagebrush shrub-steppe, and eastside (interior) grassland mapped within the Wind Energy Micrositing Corridor and Solar Siting Areas that may provide suitable habitat for woven-spore lichen.

Table C-1. Habitat Suitability Criteria

Habitat Factor	Suitability Criteria
Dominance of native species	Area dominated by native species and with relatively low cover (less than approximately 50 percent cover) of non-native grasses and forbs
Presence of disturbance – livestock grazing	Areas where livestock grazing was not noted or where livestock grazing appeared to be light to moderate (some grazing and/or presence of cow sign noted)
Presence of disturbance – wildfire	No documented fires in area in the past 20 years (DNR 2021)
Percent slope	Slopes less than 15 percent
Proximity to a waterbody (e.g., river or drainage)	Drainages or other waterbodies are present within vicinity.[1]

[1] The literature does not define a distance to a waterbody to help determine habitat suitability for woven-spore lichen; therefore, this habitat suitability criterion was not used to eliminate any areas of potentially suitable habitat.

4 RESULTS

Based on the factors listed in Table C-1, approximately 18.9 acres of habitat was considered potentially suitable for woven-spore lichen (Figure C-1). This includes approximately 10.9 acres of dwarf shrub-steppe and 8.0 acres of sagebrush shrub-steppe habitat. All areas mapped as eastside (interior) grassland within the Micrositing Corridor and Solar Siting Areas were determined not to contain suitable habitat for woven-spore lichen based on at least one of the factors listed in Table C-1.

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FIGURE

Horse Heaven Wind Project

SCOUT CLEAN ENERGY

Figure C-1
Woven-spore Lichen Habitat Suitability
BENTON COUNTY, WA

- Project Lease Boundary (12/01/20)
- Wind Energy Micrositing Corridor (12/03/20)
- Solar Siting Area

Potential Suitable Habitat for Woven-spore Lichen

Habitat Types

- Dwarf Shrub-steppe
- Sagebrush Shrub-steppe

TETRA TECH

Reference Map

1:140,000 WGS 1984 UTM Zone 11N

0 1 2 4 Miles

NOT FOR CONSTRUCTION

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ATTACHMENT D
REPRESENTATIVE HABITAT PHOTOGRAPHS

Photo 1. Active wheat field within northeastern portion of the 2021 Survey Area.

Photo 2. Fallow wheat field (foreground) adjacent to non-native grassland (left background) dominated by cereal rye (*Secale cereale*).

Photo 3. Fallow wheat field (left), active wheat field (background), and non-native grassland dominated by cereal rye (foreground) in central portion of 2021 Survey Area.

Photo 4. Developed/disturbed habitat: gravel pile for road repair and construction.

Photo 5. Eastside (interior) grassland dominated by needle-and-thread (*Hesperostipa comata*), cheatgrass (*Bromus tectorum*), and cereal rye in southeastern portion of 2021 Survey Area.

Photo 6. Eastside (interior) grassland dominated by Great Basin wildrye (*Leymus cinereus*). Non-native grassland dominated by cereal rye in background.

Photo 7. Eastside (interior) grassland habitat along Badger Canyon.

Photo 8. Non-native grassland dominated by cheatgrass (*Bromus tectorum*) and cereal rye. Active wheat field and remnant sagebrush shrub-steppe (located outside 2021 Survey Area) observable in background.

Photo 9. Non-native grassland dominated by cheatgrass, prickly lettuce (*Lactuca serriola*), and yellow salsify (*Tragopogon dubius*) in northeast portion of 2021 Survey Area.

Photo 10. Higher-quality planted grassland dominated by big bluegrass (*Poa secunda* ssp. *juncifolia*) and bluebunch wheatgrass (*Pseudoroegneria spicata*) in northeast portion of 2021 Survey Area.

Photo 11. High cover of cheatgrass and yellow salsify in lower-quality planted grassland in southeast portion of 2021 Survey Area.

Photo 12. Dead grasses in planted grassland habitat in southwest portion of 2021 Survey Area.

Photo 13. Rabbitbrush shrubland in area burned during the Locust Grove Fire in 1990.

Photo 14. Rabbitbrush shrubland on hillslopes along I-82 in area burned during the Locust Grove Fire in 1990.

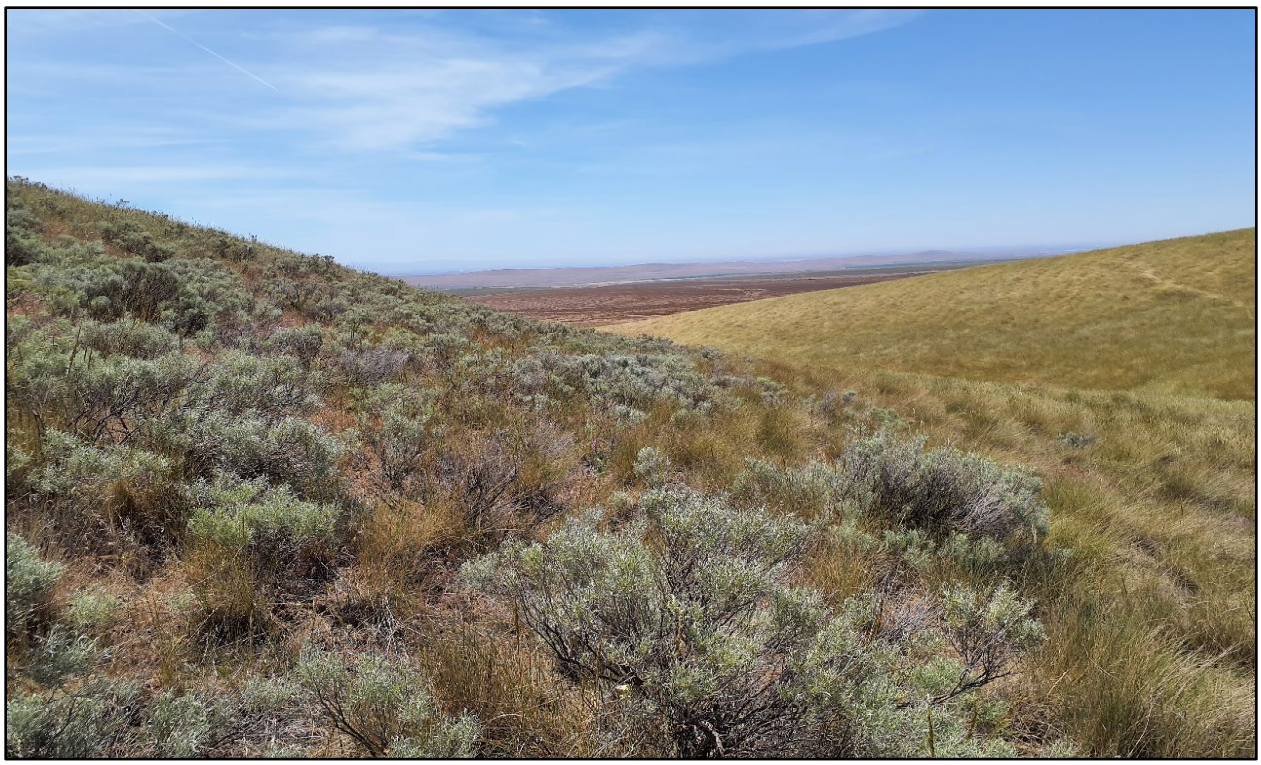

Photo 15. Rabbitbrush shrubland on hillslopes in central-eastern portion of 2021 Survey Area.

Photo 16. Patches of sagebrush shrub-steppe interspersed with non-native grassland on hillslopes and in drainage in southeastern portion of the 2021 Survey Area. Sagebrush shrub-steppe in background is located outside the 2021 Survey Area.

Photo 17. Sagebrush shrub-steppe habitat degraded by heavy grazing and high cover of cheatgrass.

Photo 18. Dead big sagebrush shrub (*Artemisia tridentata*) in area of sagebrush shrub-steppe habitat burned during the Dennis Road fire in 2020.