Attachment F. Botanical Survey Report

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2022 Botanical and Vegetation Communities Survey Report for the Carriger Solar, LLC Project

Prepared for:

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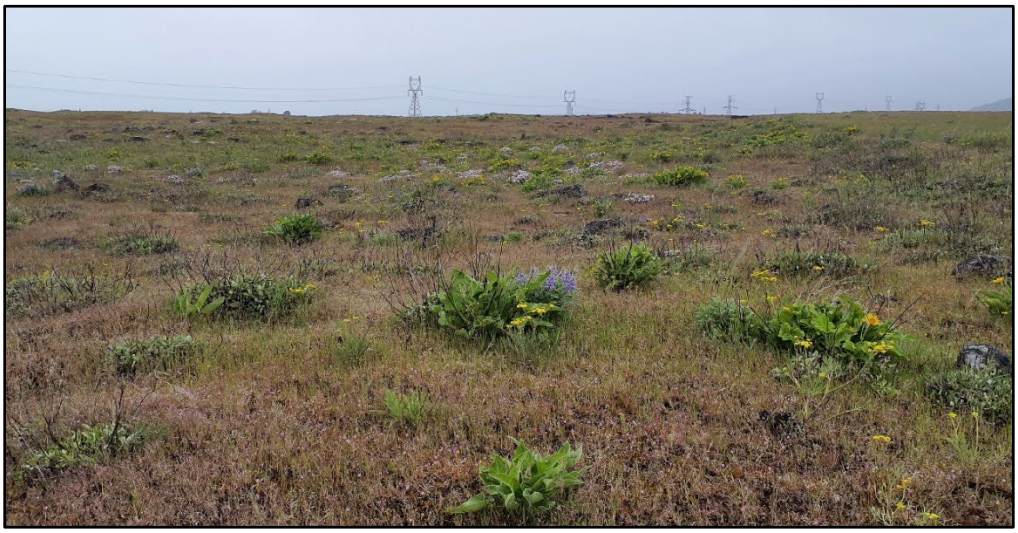

Prepared by:

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CONFIDENTIAL BUSINESS INFORMATION

EXECUTIVE SUMMARY

On behalf of Cypress Creek Renewables, LLC (CCR), Tetra Tech, Inc (Tetra Tech) conducted botanical and vegetation communities surveys at the Carriger Solar, LLC Project (Project) in April, May, and June 2022 as part of agency approved baseline survey efforts. The Project is located 2 miles west of the city of Goldendale in Klickitat County, Washington. The Project Survey Area consists of 2,011 acres of private land and includes approximately 1-mile of right-of-way (ROW) along Knight Road. Surveys consisted of a biologist walking meandering transects that traverse the survey area and targets the full array of major vegetation types (with the exception of agricultural fields), aspects, topographical features, habitats, and substrate types. During the surveys, the biologist recorded the locations of rare plants and state and county-listed noxious weed species and mapped vegetation communities observed within the Project Survey Area.

One rare plant, the state threatened foxtail mousetail (*Myosurus alopecuroides*) was observed during the surveys. Approximately 700 individuals were observed in three small vernal pools covering approximately 0.015 acre. Twelve state and/or county-listed noxious weeds were documented within the Project Survey Area, many of which were abundant or commonly observed. Six vegetation communities were mapped within the Project Survey Area: agriculture, pastures, and mixed environs; dwarf shrub-steppe; eastside (interior) grassland; eastside (interior) riparian-wetlands; ponderosa pine forest and woodlands (includes eastside oak); and urban and mixed environs. Four of these, dwarf shrub-steppe; eastside (interior) grassland; eastside (interior) riparian-wetlands; and ponderosa pine forest and woodlands (includes eastside oak), are considered Priority Habitats by the Washington Department of Fish and Wildlife (WDFW). In addition, dwarf shrub-steppe vegetation and portions of the ponderosa pine forest and woodlands (includes eastside oak) vegetation observed within the Project Survey Area corresponds with ecological community types considered rare or high-quality ecological communities by the Washington Natural Heritage Program (WNHP) (WNHP 2021d).

Tetra Tech recommends avoiding rare plant populations, plus a 150-foot buffer to avoid direct impacts and minimize indirect impacts to rare plants observed during field surveys. Tetra Tech also recommends that CCR prepare a Revegetation and Noxious Weed Management Plan in consultation with the Klickitat County Weed Control Board that would include methods for revegetating areas disturbed by construction, measures for minimizing the introduction and spread of noxious weeds during construction and operation, methods for monitoring for and controlling infestations of noxious weeds during Project construction and operation. Tetra Tech also recommends avoiding Priority Habitats and rare/high-quality ecological communities to the extent feasible.

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Acronyms and Abbreviations

CCR	Cypress Creek Renewables, LLC
CAO	Klickitat County Critical Area Ordinance
ESA	Endangered Species Act
GMA	Growth Management Act
GPS	global positioning system
IPaC	Information for Planning and Consultation
PHS	Priority Habitats and Species
Project	Carriger Solar Project
RCW	Revised Code of Washington
SEPA	State Environmental Policy Act
Tetra Tech	Tetra Tech, Inc.
USFWS	U.S. Fish and Wildlife Service
USNVC	U.S. National Vegetation Classification
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WDNR	Washington Department of Natural Resources
WNHP	Washington Natural Heritage Program
WSNWCB	Washington State Noxious Weed Control Board

1.0 Project Background, Setting, and Purpose

This summary report presents the methods and results for the 2022 botanical and vegetation communities surveys conducted by Tetra Tech, Inc. (Tetra Tech) for the Carriger Solar, LLC Project (Project), performed for Cypress Creek Renewables (CCR) to support Project permitting and inform potential avoidance, minimization, and mitigation measures. The purpose of the surveys was to document the presence of rare vascular plant species and noxious weeds and map vegetation communities within the Project Survey Area. The Project Survey Area consists of approximately 2,011 acres of the 2,108-acre Project Lease Boundary and includes approximately 1-mile of right-of-way along Knight Road (Figures 1a and 1b). The Project Survey Area includes all areas under consideration for Project development.

The Project is located 2 miles west of the city of Goldendale in Klickitat County, Washington. The Project is located within the Columbia Plateau Region (Clarke and Bryce 1997). The topography within the Project Survey Area is relatively flat with gentle rolling hills (Figure 1b). Most of the habitat has been converted to agriculture. Land use within the Project Survey Area consists primarily of farming and ranching activities, with land cover being predominantly cultivated crops.

Eighteen soil map units are mapped in the Project Survey Area (Figure 2; Appendix A). Silt loam soils were the primary underlying soil type accounting for approximately 1,665 acres (83 percent) of the soil types within the Project Survey Area. The dominant soil mapped within the Project Survey Area is the Goldendale silt loam, basalt substratum, 2 to 5 percent slopes which comprises approximately 767 acres (38 percent) of the Project Survey Area (Figure 2).

2.0 Federal, State, and Local Regulations

This section provides a brief background on federal, state and local regulations pertaining to botanical and vegetation communities potentially present in the vicinity of the Project.

2.1 Federal

2.1.1 Endangered Species Act

The Endangered Species Act (ESA) establishes protections for fish, wildlife, and plants that are listed as threatened or endangered; outlines the process for adding species to and removing them from the list of threatened and endangered species, requires the preparation and implementation of plans for their recovery; provides for interagency cooperation to avoid take of listed species and for issuing permits for otherwise prohibited activities; provides for cooperation with States, including authorization of financial assistance; and implements the provisions of the Convention on International Trade in Endangered Species of Wild Flora and Fauna. Under the ESA imperiled animals are protected wherever they occur, but endangered plants are protected only on federal lands.

2.2 State and Local

2.2.1 Threatened and Endangered Species

Washington provides protection for certain wildlife species under the Revised Code of Washington (RCW) 77.12.020, which states that the Washington Fish and Wildlife Commission has the authority to designate species of wildlife as endangered or as protected species, which also includes threatened and sensitive species. However, plant species are not protected under this statute. Although the Washington Natural Heritage Program (WNHP) maintains a list of plants classified as threatened, endangered, or sensitive in the state (see Section 2.2.4), these species are not provided protection under Washington State laws or policy.

2.2.2 Noxious Weeds

The Washington State Noxious Weed Control Board (WSNWCB) advises the Washington State Department of Agriculture about noxious weed control in Washington state. Through its actions and policy decisions, the WSNWCB helps coordinate and support the activities of the various regional noxious weed control boards and weed districts of Washington. The WSNWCB also maintains the state's official list of noxious weeds (as established in Washington Administrative Code [WAC] 16-750), which landowners are required to control.

Chapter 17.10 of the RCW mandates the establishment of county noxious weed control boards. In Klickitat County, per Chapter 17.10 RCW, the Klickitat County Noxious Weed Control Board acts as the local governing body administering Washington's noxious weed law.

2.2.3 WDFW Priority Habitats and Species List

The Washington Department of Fish and Wildlife (WDFW) maintains a list of Priority Habitats and Species (PHS) the agency deems to be of priority for conservation and management. Priority habitats are habitat types or elements with unique or significant value to a large number of species. A priority habitat may consist of a unique vegetation type like shrubsteppe, dominant plant species like juniper savannah, or a specific habitat feature like cliffs.

The PHS List explains why each priority habitat and species is on the list, shows which counties have that species or habitat, and provides links to PHS management recommendations. Cities and counties use PHS for permit evaluation purposes and to fulfill land use planning requirements under the Growth Management Act (GMA) and Shoreline Management Act.

2.2.4 Washington Natural Area Preservation Act

The Washington Natural Area Preserves Act, as amended in 1981 (RCW 79.70), established the Natural Heritage Advisory Council and the WNHP. This program is implemented by the Washington Department of Natural Resources (WDNR) and 1) identifies the species and ecosystems that are considered priorities for conservation efforts in the state, and 2) maintains a database of priority species and ecosystems. This information is used, in part, to inform the WDFW's PHS database (see Section 2.2.3). The WNHP list of plants and nonvascular species considered to be rare and of

conservation concern in Washington includes a rank for each species based on information on distribution, abundance, condition, and threats and trends, and assigns a state conservation status of endangered, threatened, sensitive, or possibly extinct/extirpated.

2.2.5 Washington State Environmental Policy Act (SEPA)

SEPA requires state and local governments to identify possible environmental impacts before making decisions. The SEPA process is designed to work with other regulatory processes to provide a comprehensive evaluation of probable impacts on all elements of the environment. State and local agencies determine whether a project or proposal needs environmental review under SEPA. Any governmental action may be conditioned or denied pursuant to SEPA (Ecology 2022). The SEPA process requires that impacts to special-status species and habitats and evaluated and WDFW will review proposed projects to identify potential impacts to fish, wildlife, and their habitats.

2.2.6 Critical Areas Ordinance

Under Washington State's GMA, all cities and counties are directed to adopt critical areas regulations. Counties and cities are required to include the best available science in developing policies and development regulations to protect the functions and values of critical areas (RCW 36.70A.172). Klickitat County's Critical Areas Ordinance (CAO) was developed to comply with the requirements of the GMA, and was most recently updated on August 6, 2013, consistent with the GMA periodic review requirement in RCW 36.70A.130. The provisions of the CAOs apply to all activities (unless exempted) in unincorporated Klickitat County that require permits or land use approves from the County. Chapter II of the Klickitat County CAO defines critical areas as including the following areas and ecosystems: 1) wetlands, 2) areas with a critical recharging effect on aquifers used for potable water, 3) fish and wildlife habitat conservation areas, 4) frequently flooded areas, and 5) geologically hazardous areas.

As described in Chapters II and IV of the Klickitat County CAO, critical wildlife habitat conservation areas include the following: 1) areas with which known federal or state endangered, threatened, or sensitive species have a primary association, where a primary association consists of areas in which there is a high relative density or species richness and the area is significant for providing breeding habitat, winter range, or movement corridors; 2) habitats of local importance (i.e., a habitat in which a species of local importance has a primary association); and 3) areas designated by the WDNR as state natural area preserves and natural resource conservation areas. Critical fish habitat conservation areas include the following: 1) naturally occurring ponds under 20 acres and their submerged aquatic beds that provide fish or wildlife habitat; 2) waters of the State as defined in Title 222 WAC; and 3) lakes, ponds, streams, and rivers planted with game fish by a governmental or tribal entity.

The CAO specifies required steps to avoid, minimize, or compensate for adverse impacts upon the functions and values of critical areas. In some cases, the CAO specifies the required mitigation, such as providing for buffer widths. In other instances, the applicant will develop mitigation. Where a project is proposed within a critical wildlife/fish habitat conservation area, and the habitat

functions and values are likely to be impaired by the project, a habitat management plan is required.

3.0 Methods

3.1 Agency Coordination

CCR and Tetra Tech met virtually with Michael Ritter and Amber Johnson of WDFW on March 30, 2022, to introduce the Project and discuss planned raptor nest, general wildlife, habitat, and botanical surveys. At the meeting, WDFW concurred with the botanical, habitat, and wildlife survey timing and survey approach. Additional details regarding this meeting are provided in the Habitat and General Wildlife Survey Report prepared for the Project (Tetra Tech 2022a).

3.2 Background Review

3.2.1 Rare Plants

Prior to conducting field surveys, Tetra Tech conducted a pre-field review of existing information on rare vascular plant species with the potential to occur in Klickitat County and the Project Survey Area. For purposes of this report, the term "rare plant" includes federally listed and candidate vascular plant species, as well as vascular plant species that are listed in Washington state as endangered, threatened, or sensitive by the WNHP. Specific sources of information that were reviewed prior to conducting field surveys included the following:

- U.S. Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) query for Klickitat County (USFWS 2022a)
- WNHP 2021 Washington Vascular Plant Species of Conservation Concern (WNHP 2021a)
- 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)
- Critical Areas Report - Carriger Solar, LLC (WSP USA 2022a)
- Wetland and Other Waters of the United States Delineation Report for the Carriger Solar Project (Ecology and Environment 2020)
- Wetland and Waterbodies Delineation Report - Carriger Solar, LLC (WSP USA 2022b)
- Critical Issues Analysis for Carriger Solar, LLC Project (TRC Environmental 2018)
- Natural Resource Conservation Service Web Soil Survey (NRCS 2022)
- Aerial imagery of the Project Survey Area (GoogleEarth Pro 2022)

Based on review of the above sources, Tetra Tech compiled a list of rare vascular plant species known to occur or with the potential to occur in the Project Survey Area (Appendix B). As further

detailed in Appendix B, each of the species identified as potentially occurring within the Project Survey Area was assigned a "likelihood of occurrence" (i.e., highly unlikely, unlikely, low, moderate) based on: 1) the proximity of known occurrences, 2) whether the known occurrences of the species in Klickitat County are historical occurrences, 3) the known range of the species, and 4) the likelihood of suitable habitat occurring within the Project Survey Area.

Prior to conducting field surveys, Tetra Tech completed a review of existing literature, herbarium records, and other sources to generate fact sheets or "field guides" for each rare plant species with the potential to occur within the Project Survey Area. These fact sheets were used by the surveyors in the field and included the following:

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

3.2.2 Noxious Weeds

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

3.2.3 Vegetation Communities

Prior to conducting field surveys, Tetra Tech reviewed the Critical Issues Analysis prepared for the Project (TRC Environmental 2018). Tetra Tech also conducted a desktop review of existing information to identify potential vegetation communities that might be encountered within the Project Survey Area. Sources that were utilized for the preliminary desktop evaluation are presented in Table 1.

Table 1. Sources Utilized for Preliminary Desktop Vegetation Communities Evaluation

Source and Citation	Information Provided in Dataset
WNHP Element Occurrence database (WNHP 2021b)	Database of known locations of rare and imperiled species and ecological communities within Washington State
WNHP Rare/High Quality Ecological Communities (WNHP 2021d)	List of known occurrences of rare/high quality ecological communities known to occur in Klickitat County.
WDFW Priority Habitats and Species (PHS) database (WDFW 2021)	Priority Habitats and Species database query results for the Project Lease Boundary and a 1-mile buffer. Priority habitats and features are "habitat types or elements with unique or significant value to a diverse assemblage of species" and are considered priorities for conservation and management in Washington (WDFW 2008).
PHS Shrubsteppe – Klickitat County (WDFW 2022)	Locations of potential shrub-steppe and eastside steppe habitat within and adjacent to the Project Survey Area.

Source and Citation	Information Provided in Dataset
National Land Cover Database land cover data (Homer et al. 2020)	Land cover types (e.g., shrub/scrub, cultivated crops, grassland/ herbaceous), based on land cover modeling, mapped within and adjacent to the Project Survey Area.
Wetlands and Other Waters of the United States Delineation Report (Ecology and Environment 2020). Wetland and Waterbodies Delineation Report, Carriger Solar Project (WSP USA 2022).	Locations of wetlands and other waters delineated within the Project Survey Area.
Google Earth Pro (Google Earth Pro 2022)	Aerial imagery used to determine potential boundaries between land cover and vegetation types within the Project Survey Area based on aerial signatures of land cover and vegetation types.
Management recommendations for Washington's priority habitats (Azerrad et al. 2011)	Provides protocols for identifying and mapping shrub-steppe over broad landscapes.
Wildlife-habitat Relationships in Oregon and Washington (Johnson and O'Neil 2001)	Provides descriptions of habitat types found in Oregon and Washington, including those found in the Columbia Plateau ecoregion.
Ecological Systems of Washington State, A Guide to Identification (Rocchio and Crawford 2015)	Provides descriptions of natural ecological systems and vegetation types found within Washington.
WDFW Wildlife Wind Power Guideline habitat types (WDFW 2009)	Provides descriptions of various habitat types found within eastern Washington.
Washington Large Fires 1973-2020 (WDNR 2022)	Provides the locations and boundaries of large (typically over 100 acres) fires in Washington state between 1973 and 2020. Used to determine locations of past fires within and adjacent to the Project Survey Area that may have resulted in changes to vegetation within the Project Survey Area.

3.3 Field Surveys

Tetra Tech botanist Karen Brimacombe conducted botanical surveys within the Project Survey Area April 5-7, May 11-13, and June 22-24, 2022. The survey periods were chosen to coincide with the identification periods for the rare plant species having potential to occur within the Project Survey Area. Based on the National Weather Service data for Goldendale, Washington (NOAA 2022), precipitation between January and March was below average but was above average during April, May and June (NOAA 2022). With the exception of March, average temperatures between January and June 2022 were below normal (NOAA 2022). The colder temperatures and above average precipitation in April, likely resulted in delayed growth and flowering of plant species within the Project Survey Area. However, because field surveys were conducted during three different periods (April, May, and June) it allowed the surveyor to satisfactorily identify plant species (including rare plant species and noxious weeds) and vegetation communities observed within the Project Survey Area.

3.3.1 Rare Plants

Field surveys were conducted using the focused intuitive controlled survey method, which is a standard and commonly accepted survey protocol (USFS and BLM 1999). This method incorporates

meandering transects that traverse the survey area and targets the full array of major vegetation types (with the exception of agricultural fields, which do not support rare plant species and are exposed to ongoing active disturbances on a regular basis), aspects, topographical features, habitats, and substrate types. The distribution of survey effort is based on habitat conditions observed in the field, 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 rare plant species (e.g., intact native grassland).

While traversing the Project Survey Area, the surveyors searched for rare plant species, and when the surveyors arrived at an area of high-potential habitat for rare plant species, they conducted a complete survey for the rare species (i.e., the entire area of high-potential habitat is surveyed). Because this method focuses survey efforts on the parts of the landscape most likely to support rare plant species, surveyors were required to be familiar with all information in each species' fact sheet before beginning surveys.

When surveyors encountered a rare plant species, they recorded the global positioning system (GPS) location with a tablet using ArcGIS Collector software and an external GPS receiver capable of sub-meter accuracy. Surveyors mapped a polygon that encompassed all individuals of the rare plant in each population observed. Surveyors also completed WNHP rare plant sighting forms for each population (copies available upon request) and took photographs to serve as digital specimen vouchers to illustrate identifying characteristics, plant habits, and habitat.

Data for each population included the following:

- Species phenology
- Number of plants observed
- Habitat information and associated species
- Visible threats
- Representative photos of individuals and habitat

To maximize the likelihood of detecting and accurately identifying rare plant species, survey dates were scheduled to coincide with the recommended survey periods for rare plant species with potential to occur in the Project Survey Area (Appendix B). When potential rare plant species were encountered too early in their phenology to be identified definitively, their locations were recorded, and these plants revisited later in the season when definitive identification could be made.

During surveys, Tetra Tech maintained a running list of vascular plant species encountered and made informal collections of unknown species for later identification. Identification was verified through the use of appropriate plant keys—in particular, *Flora of the Pacific Northwest* (Hitchcock and Cronquist 2018). The final vascular plant species list for the Project Survey Area is included as Appendix C in this report.

3.3.2 Noxious Weeds

Noxious weed surveys were conducted concurrently with rare plant surveys. Tetra Tech recorded observations of state- and county-listed noxious weeds (KCNWCB 2021; WSNWCB 2021). When a noxious weed was encountered in the Project Survey Area, the location was recorded with a GPS point and the species, estimated size of infestation (i.e., small – less than 0.1 acre, medium – 0.1 to 1 acre, or large – 1 to 5 acres), and relative abundance (i.e., sparse [only a few individuals noted or low cover of species in area], common [many individuals of the species noted in area], or very high cover [dense population of the species]) was recorded.

3.3.3 Vegetation Communities

Tetra Tech conducted vegetation community surveys concurrently with rare plant and noxious weed surveys which consisted of a biologist walking meandering transects in non-cultivated land within the Project Survey Area. Field surveys were conducted by a biologist familiar with vegetation communities of the Washington Columbia Plateau Ecoregion, WDFW Priority Habitats (WDFW 2008), and the WDFW Wind Power Guidelines habitat categories[1] (WDFW 2009).

During field surveys, vegetation communities within the Project Survey Area were documented, mapped, and characterized. In general, vegetation community types were adapted from descriptions in W*ildlife-Habitat Relationships in Oregon and Washington* (Johnson and O'Neil 2001), *Ecological Systems of Washington State, A Guide to Identification* (Rocchio and Crawford 2015), the Priority Habitats and Species List (WDFW 2008), and the WDFW Wind Power Guidelines (WDFW 2009). To assist in mapping vegetation communities, the biologist collected GPS points at each change in vegetation community encountered. Dominant plant species and other habitat characteristics observed at these points (e.g., percent cover of native and non-native species, disturbances noted) were recorded to accurately classify and describe vegetation communities. In addition, the biologist scanned the adjacent landscape from vantage points that allowed views across the landscape to help map vegetation community boundaries.

Vegetation community boundaries were digitized either in the field using aerial imagery on Samsung Galaxy tablets using ArcGIS Field Maps software and/or by drawing vegetation community boundaries (based on data collected in the field) in Google Earth that were then digitized following the field surveys. A minimum mapping unit of 1 acre was implemented.

[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 (i.e., vegetation communities) for proposed wind power projects. Currently, there are no similar guidelines for solar power projects.

4.0 Results

4.1 Background Review

4.1.1 Rare Plants

Based on the background review of existing information, no federally listed threatened, endangered, or candidate plant species have the potential to occur within Klickitat County (USFWS 2022). One species, whitebark pine (*Pinus albicaulis*), that is proposed for listing as a federally threatened species has the potential to occur within Klickitat County (WNHP 2021a). This species is primarily found at upper tree line in subalpine areas of higher mountains and very occasionally found in small stands at lower elevations (WNHP 2021c). In Washington, populations of whitebark pine are mostly found between 4,200-7,975 feet in elevation. Based on these habitat characteristics, suitable habitat for whitebark pine does not occur in the Project Survey Area.

Including whitebark pine, which is listed as a state sensitive species, a total of 75 vascular plant species listed as endangered, threatened, or sensitive in the state of Washington by the WNHP are known to occur or could potentially occur within Klickitat County (WNHP 2021a). Appendix B provides the list of the 75 rare plant species known or potentially occurring in Klickitat County, as well as their state status, preferred habitat, likelihood of occurring in the Project Survey Area, and recommended survey period.

Eight of these 75 rare plant species have been documented within 10 miles of the Survey Area (Figure 3; WNHP 2021b). These eight species include:

- Baker's linanthus (*Leptosiphon bolanderi*) - state sensitive;
- Barrett's beardtongue (*Penstemon barrettiae*) - state threatened;
- common bluecup (*Githopsis specularioides*) - state sensitive;,
- foxtail mousetail (*Myosurus alopecuroides*) - state threatened;
- long-bearded mariposa lily (*Calochortus longebarbatus* var. *longebarbatus*) - state sensitive;
- obscure buttercup (*Ranunculus triternatus*) - state endangered;
- ribseed biscuitroot (*Lomatium tamanitchii*) - state sensitive; and
- Suksdorf's desert-parsley (*Lomatium suksdorfii*) - state sensitive.

The closest documented occurrence is an occurrence of Suksdorf's desert parsley which has been documented approximately 5 miles to the west of the Project Survey Area.

4.1.2 Noxious Weeds

Based on the background review, 155 species are currently designated as noxious weeds in Washington State, including 38 Class A Weeds, 66 Class B Weeds, and 51 Class C Weeds (WSNWCB 2021). In Klickitat County, 127 species are currently designated as noxious weeds, including 38

Class A Weeds, 41 Class B Designate Weeds, 25 Class B Non-Designate Weeds, and 23 Class C Weeds (KCNWCB 2021). Per the WSNWCB (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.

4.1.3 Vegetation Communities

The desktop review confirmed the absence of USFWS Critical Habitat within the Project Survey Area (USFWS 2022a, b). No rare or high-quality ecological communities have been identified within the Project Survey Area; however, two rare or high-quality ecological communities (douglas-fir/ oceanspray/geyer's sedge forest and Oregon white oak woodland), have been documented to the southwest of the Project Survey Area (Figure 3; WNHP 2021d). Queries of the PHS datasets identified two Priority Habitats within the Project Survey Area (eastside steppe and shrub-steppe) and one Priority Habitat (Oregon white oak woodland) to the east of the Project Survey Area (Figure 3; WDFW 2022a, b, d). Multiple perennial, intermittent, and ephemeral streams, as well as several wetlands were identified within the Project Survey Area during wetland and other water delineation surveys conducted for the Project (Ecology and Environment 2020, Tetra Tech 2022b, WSP USA. 2022b.). There are no past large wildfires identified as having occurred within the vicinity of the Project since 1973 (WDNR 2022).

4.2 Field Surveys

4.2.1 Rare Plants

Tetra Tech documented one special-status plant species, the state threatened foxtail mousetail, a tiny annual forb in the buttercup (Ranunculaceae) family, within the Project Survey Area. Foxtail mousetail is an obligate vernal pool species found on hard, bare, desiccated clay, in sparsely vegetated areas of shallow pools (WNHP 2021c). Individuals of foxtail mousetail were observed within three small vernal pools in the central portion of the Project Survey Area (Figure 4). Approximately 700 plants occupying 0.015 acre were documented within these vernal pools. The vernal pools were located within dwarf shrub-steppe habitat.

When documented on May 12, all observed plants were beginning to set seed. Visible threats to observed individuals included the presence of non-native invasive plant species and grazing activity. Associated species included the native forbs needleleaf navarretia (*Navarretia intertexta*), close-flowered knotweed (*Polygonum polygaloides s*sp. *confertiflorum*), woollyheads (*Psilocarphus elatior*, *P. oregonus*), tiny mousetail (*Myosurus minimus*), Scouler's popcorn flower (*Plagiobothrys scouleri*) and annual burnet (*Poteridium annuum*), as well as the non-native grasses bulbous bluegrass (*Poa bulbosa*), cheatgrass (*Bromus tectorum*), Mediterranean barley (*Hordeum marinum* ssp. *gussoneanum*), and vententa (*Ventenata dubia*). Representative photos of individuals and habitat of foxtail mousetail within the Project Survey Area are provided in Appendix D.

4.2.2 Noxious Weeds

Tetra Tech observed 12 state- and/or county-listed noxious weed species during field surveys. Table 1 lists the noxious weed species observed (scientific and common name), their noxious weed designation, the frequency of observations within the Project Survey Area, and sizes of infestations. Figure 5 shows the locations of noxious weeds observed during field surveys.

Three noxious weed species were abundant throughout the Project Survey Area: field bindweed (*Convolvulus arvensis*), medusahead (*Taeniatherum caput-medusae*), and ventenata (Figure 5). Field bindweed and medusahead were observed throughout all but the northern portion of the Project Survey Area and ventenata was documented throughout the Project Survey Area. Infestations of these three species were typically medium-sized (0.1 to 1 acre) or large (1 to 5 acres) and consisted of moderately dense to dense cover of individuals in the areas where observed.

Four species were commonly observed within the Project Survey Area: Canada thistle (*Cirsium arvense*), cereal rye (*Secale cereale*), reed canarygrass (*Phalaris arundinacea*), and rush skeletonweed (*Chondrilla juncea*). Canada thistle was commonly observed along streams in the central and southern portions of the Project Survey Area. Small (less than 0.1 acre) to large (1-5 acres) of cereal rye were observed in various locations throughout the Project Survey Area. Infestations consisted of sparse, scattered individuals to areas with high cover of cereal rye. Reed canarygrass was commonly observed along streams and wetlands in the southern portion of the Project Survey Area. Most infestations were medium or large in size and consisted of dense cover of reed canarygrass. Rush skeletonweed was observed in scattered locations throughout the Project Survey Area, but was most abundant in the central portion. Infestations ranged from sparse, scattered individuals to areas with high cover of rush skeletonweed.

The remaining five noxious weeds—bull thistle (*Cirsium vulgare*), evergreen blackberry (*Rubus laciniatus*), jointed goatgrass (*Aegilops cylindrica*), sulphur cinquefoil (*Potentilla recta*), and yellow toadflax (*Linaria vulgaris*)—were observed in 1 to 6 locations in the Project Survey Area. Bull thistle was observed in three locations in the central and southern portions of the Project Survey Area. All observations were along or near streams. One small (less than 0.1 acre) observation of evergreen blackberry was documented in the southwestern portion of the Project Survey Area. Jointed goatgrass was observed in six locations in the central and southern portions of the Project

Survey Area. Most infestations were adjacent to roads or agricultural fields. Sulphur cinquefoil was observed in three locations, two in the southern and one in the northern portion of the Project Survey Area. The observation in the northern portion was small (less than 0.1 acre) and consisted of sparse individuals; whereas the two observations in the south consisted of larger (greater than 1 acres), moderately dense infestations. Yellow toadflax was observed in one location in the southwestern portion of the Project Survey Area. This infestation was medium-sized (0.1 to 1 acre) and moderately dense.

Table 2. Noxious Weeds Observed within the Project Survey Area

Common Name	Scientific Name	State Status/County Status[1]	Frequency of Observations	Infestation Size[2]
Bull thistle	*Cirsium vulgare*	Class C / Not listed	Observed in three locations in Project Survey Area.	Two small (<0.1 acre) and one medium-sized infestation observed.
Canada thistle	*Cirsium arvense*	Class C / Class C	Commonly observed in Project Survey Area.	Infestations typically consisted of small, moderately dense infestations and medium-sized, moderately dense infestations.
Cereal rye	*Secale cereale*	Class C / Not listed	Commonly observed in Project Survey Area.	Infestations ranged in size from small to large.
Evergreen blackberry	*Rubus laciniatus*	Class C / Not listed	Observed in one location in Project Survey Area.	Observation consisted of a small, moderately dense infestation.
Field bindweed	*Convolvulus arvensis*	Class C / Not listed	Abundant throughout Project Survey Area.	Infestations ranged from small to large patches consisting of sparse, scattered individuals to areas with high cover of field bindweed.
Jointed goat grass	*Aegilops cylindrica*	Class C / Class C	Observed in six locations in the Project Survey Area.	Most infestations were small; however, two infestations were medium-sized.
Medusahead	*Taeniatherum caput-medusae*	Class C / Not listed	Abundant throughout much of the Project Survey Area.	Most infestations were larger than 1 acre and consisted of high cover of medusahead.
Reed canarygrass	*Phalaris arundinacea*	Class C / Not listed	Observed in several locations in Project Survey Area.	Observation typically consisted of a medium to large-sized, dense infestations.
Rush skeletonweed	*Chondrilla juncea*	Class B / Class B	Commonly observed in Project Survey Area.	Infestations typically consisted of small, moderately dense infestations; however, several medium-sized, dense infestations were also observed.
Sulphur cinquefoil	*Potentilla recta*	Class B / Class B	Observed in three locations in Project Survey Area.	Infestations ranged in size from small, sparse infestations to large, dense infestations.
Ventenata	*Ventenata dubia*	Class C / Not listed	Abundant throughout the Project Survey Area.	Most infestations were larger than 1 acre and consisted of high cover of ventenata.

Common Name	Scientific Name	State Status/County Status[1]	Frequency of Observations	Infestation Size[2]
Yellow toadflax	*Linaria vulgaris*	Class C / Not listed	Observed in one location in the southwestern portion of Project Survey Area.	Infestation was less than 1 acre in size and moderately dens.

[1] Definitions for the noxious weed classes are provided in Section 3.1.2. Class B "Designate" weeds are those designated for control in Klickitat County.

[2] Infestation size: small = less than 0.1 acre; medium = 0.1 to 1 acre; large = greater than 1 acre.

4.2.3 Vegetation Communities

Vegetation within the majority of the Project Survey Area has been modified due to historic and current agriculture and grazing activity. Native vegetation communities have been replaced by cultivated croplands and non-native invasive grasses and forbs are prevalent throughout the Project Survey Area due to historic and current farming and grazing activity.

Six vegetation communities were mapped within the Project Survey Area: agriculture, pastures, and mixed environs; dwarf shrub-steppe; eastside (interior) grassland; eastside (interior) riparian-wetlands; ponderosa pine forest and woodlands (includes eastside oak); and urban and mixed environs. As noted above, vegetation community types were adapted from the habitat descriptions in *Wildlife-Habitat Relationships in Oregon and Washington* (Johnson and O'Neil 2001), *Ecological Systems of Washington State, A Guide to Identification* (Rocchio and Crawford 2015), the WDFW PHS List (WDFW 2008), and the WDFW Wind Power Guidelines (WDFW 2009). Five of these habitat types – dwarf shrub-steppe, eastside (interior) riparian – wetlands, ponderosa pine forest and woodlands (includes eastside oak), and eastside (interior) grasslands are considered Priority Habitat types by the WDFW (Table 3). In addition, dwarf shrub-steppe vegetation observed within the Project Survey Area corresponds with both the arrow-leaf buckwheat (*Eriogonum compositum*) / Sandberg's bluegrass (*Poa secunda*) and the rock buckwheat (*Eriogonum sphaerocephalum*) / Sandberg's bluegrass vegetation communities which are considered rare or high-quality ecological communities by the WNHP (WNHP 2021d). The area mapped as ponderosa pine forest and woodlands (includes eastside oak) in the northeastern portion of the Project Survey Area corresponds to the ponderosa pine (*Pinus ponderosa*) - Oregon white oak (*Quercus garryana*) / arrowleaf balsamroot (*Balsamorhiza sagittata*) woodland which is considered a rare or high-quality ecological community by the WNHP (WNHP 2021d).

Table 3 lists the acres of each vegetation community found within the Project Survey Area while Figure 6 displays the location of the habitat types mapped within the Project Survey Area. Representative photos and descriptions of each of these vegetation communities is provided in the Habitat and General Wildlife Survey Report prepared for the Project (Tetra Tech 2022a). In addition to the eight vegetation communities listed in Table 3, multiple 23 wetlands and 14 stream segments were mapped within the Project Survey Area (Figure 6). These features are discussed in the Amendment to the 2020 and 2022 Carriger Solar and Wetland and Waterbodies Delineation Reports (Tetra Tech 2022b).

Table 3. Vegetation Communities Mapped within the Project Survey Area

Habitat Type (Per Johnson and O'Neil 2001)	Habitat Type (Per WDFW 2009)	Habitat Type (Per Rocchio and Crawford 2015)	Acres in Project Survey Area	Percent of Project Survey Area
Agriculture, Pastures, and Mixed Environs	Croplands, Pasture, and Mixed Environs	None[6]	1,727	86%
Dwarf Shrub-steppe[1]	Shrub-steppe	Columbia Plateau Scabland Shrubland	228	11%
Urban and Mixed Environs	Urban and Mixed Environs	None[6]	24	1%
Eastside (Interior) Riparian-Wetlands[1, 2]	None[5]	Columbia Basin Foothill Riparian Woodland and Shrubland / Rocky Mountain Alpine-Montane Wet Meadow[7]	21	1%
Ponderosa Pine Forest and Woodlands (includes Eastside Oak) [1, 3]	Ponderosa Pine Forest and Woodlands (includes Eastside Oak Woodlands)	Northern Rocky Mountain Ponderosa Pine Woodland and Savanna / East Cascades Oak-Ponderosa Pine Forest and Woodland	11	1%
Eastside (Interior) Grasslands[1, 4]	Eastside (Interior) Grasslands	Columbia Plateau Steppe and Grassland	<1	<1%
		Total[8]	**2,011**	**100%**

[1] Listed as a High Priority Habitat or Priority Habitat Feature by the WDFW (WDFW 2008).

[2] Listed as Riparian in WDFW 2008.

[3] Oregon White Oak Woodlands are considered a Priority Habitat per WDFW 2008.

[4] Listed as Eastside Steppe in WDFW 2008.

[5] Wetlands and riparian areas are not included as a vegetation/habitat type in WDFW 2009, as wetlands and streams are regulated under the authority of the Washington Department of Ecology and U.S. Army Corps of Engineers, and other applicable regulations and policies.

[6] Rocchio and Crawford (2015) focuses on natural ecological systems and does not include descriptions of altered (e.g., agricultural) vegetation communities.

[7] No ecological system in Rocchio and Crawford (2015) accurately describes the wet meadows observed in the Project Survey Area; the Rocky Mountain Alpine-Montane Wet Meadow ecological system is the closest match.

[8] Totals may not sum exactly due to rounding.

5.0 Conclusions and Recommendations

Botanical surveys in 2022 documented one population of the state threatened species foxtail mousetail within the Project Survey Area. This population consisted of approximately 700 individuals in three separate, but nearby vernal pools, covering 0.015 acre. Twelve noxious weeds were documented during field surveys, many of which were common or abundant within the Project Survey Area. Six habitat types were mapped within the Project Survey Area. The majority (approximately 97 percent) of the Project Survey Area consisted of two habitat types: agriculture, pastures, and mixed environs and dwarf shrub-steppe. The other four habitat types composed the remaining approximately 3 percent of the Project Survey Area.

Four of the six habitat types mapped within the Project Survey Area are considered Priority Habitats by the WDFW, including dwarf shrub-steppe (i.e., shrub steppe), eastside (interior) riparian-wetlands (i.e., riparian), ponderosa pine forest and woodlands (includes eastside oak [i.e., Oregon white oak woodlands]), and eastside (interior) grasslands (i.e., eastside steppe)(WDFW 2008). A total of approximately 260 acres (13 percent of the Project Survey Area) consisted of Priority Habitats. In addition, two of these habitat types, dwarf shrub-steppe (i.e., arrow-leaf buckwheat / Sandberg's bluegrass and rock buckwheat / Sandberg's bluegrass) and the area mapped as ponderosa pine forest and woodlands (includes eastside oak) (i.e., ponderosa pine - Oregon white oak / arrowleaf balsamroot woodland) are considered a rare or high-quality ecological communities by the WNHP (WNHP 2021d).

Based on the results of the botanical and vegetation communities surveys, the following measures are recommended to avoid and minimize potential Project-related impacts to botanical resources:

- Avoid rare plant populations, including a 150-foot buffer, to avoid direct impacts to rare plant populations and minimize indirect impacts.
- Prepare a Revegetation and Noxious Weed Management Plan in consultation with the Klickitat County Weed Control Board that would include methods for revegetating areas disturbed by construction, measures for minimizing the introduction and spread of noxious weeds during construction and operation, methods for monitoring for and controlling infestations of noxious weeds during Project construction and operation.
- Avoid Priority Habitats and rare/high-quality ecological communities to the extent feasible.

Additional recommendations specific to habitat, wildlife, and raptors are provided in the habitat and General Wildlife Survey Report (Tetra Tech 2022a) and the Raptor Nest Survey Report (Tetra Tech 2022c).

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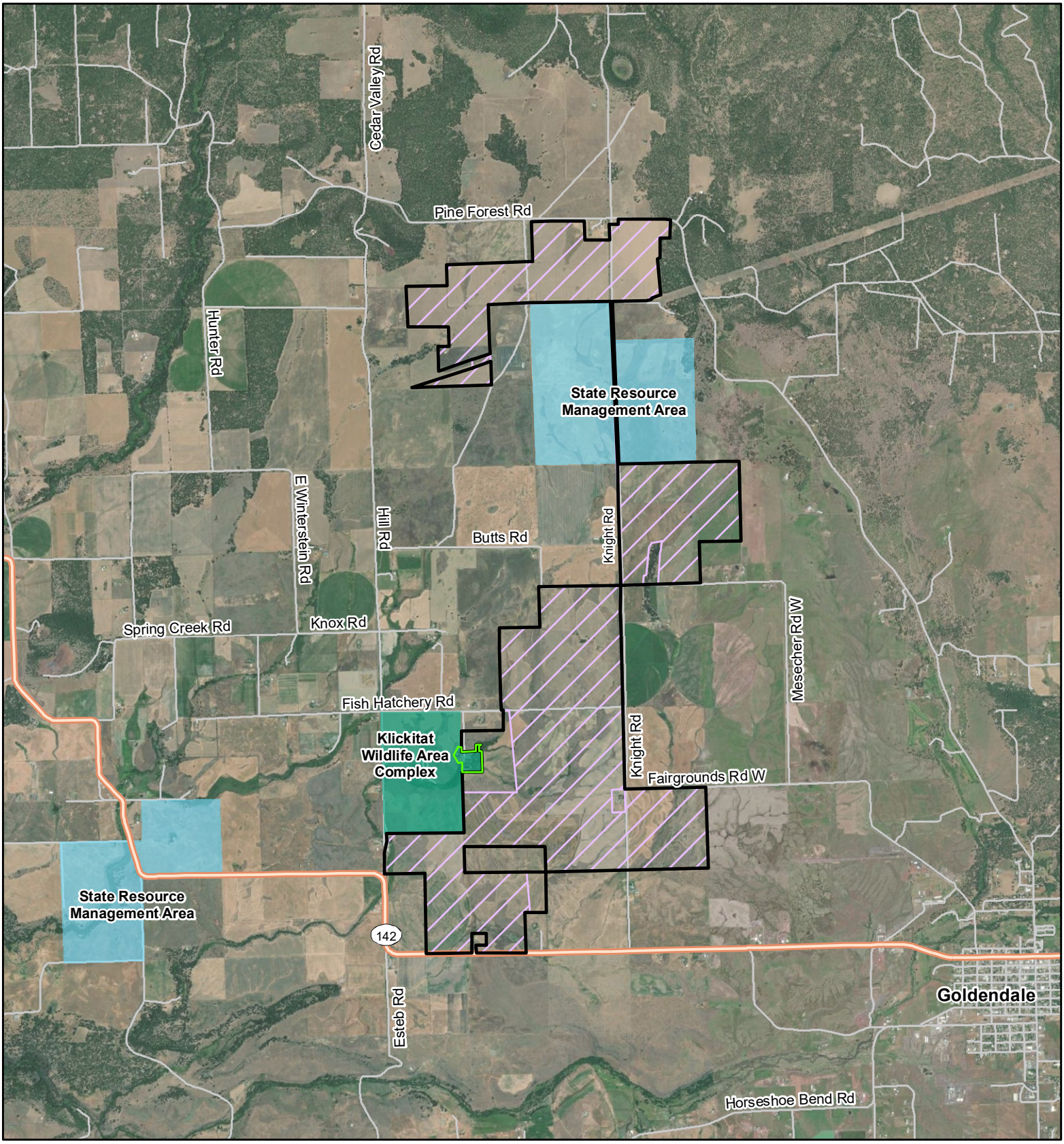
Figures



Project Lease Boundary
Project Survey Area
Public and Protected Lands
WDFW
WDNR
Goldendale Fish Hatchery
State Route
Local Road

N

0 0.5 1
Miles

Figure 1a
Project Location
(Aerial Photograph)

Carriger Solar, LLC Project
Klickitat County, WA

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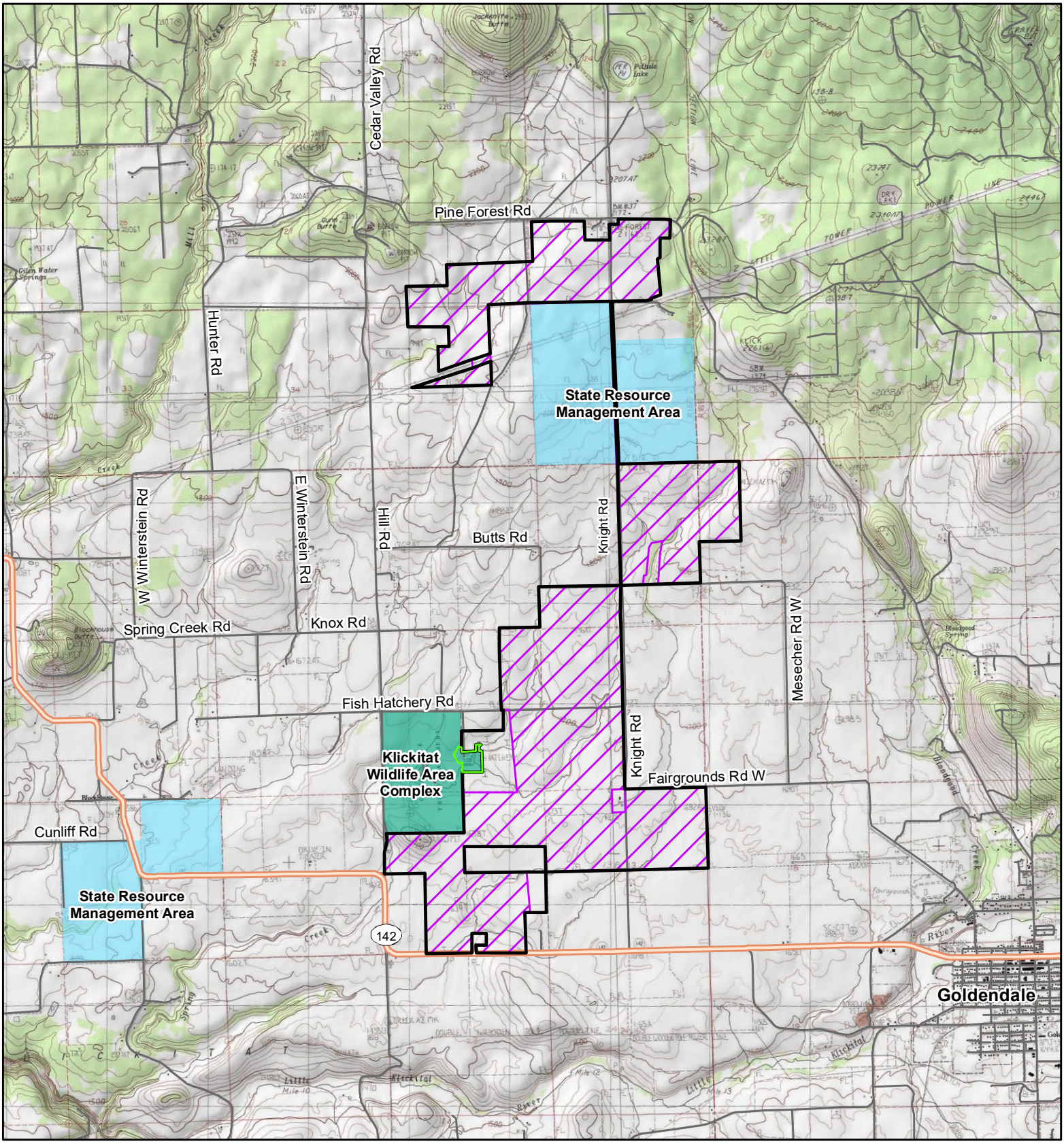

Project Lease Boundary
Project Survey Area
Public and Protected Lands
WDFW
WDNR
Goldendale Fish Hatchery
State Route
Local Road

N

0 0.5 1
Miles

USGS 7.5' Quads: Centerville, Goldendale, Indian Rock, White Pine Buttes

Figure 1b
Project Location
(Topographic Map)

Carriger Solar, LLC Project
Klickitat County, WA

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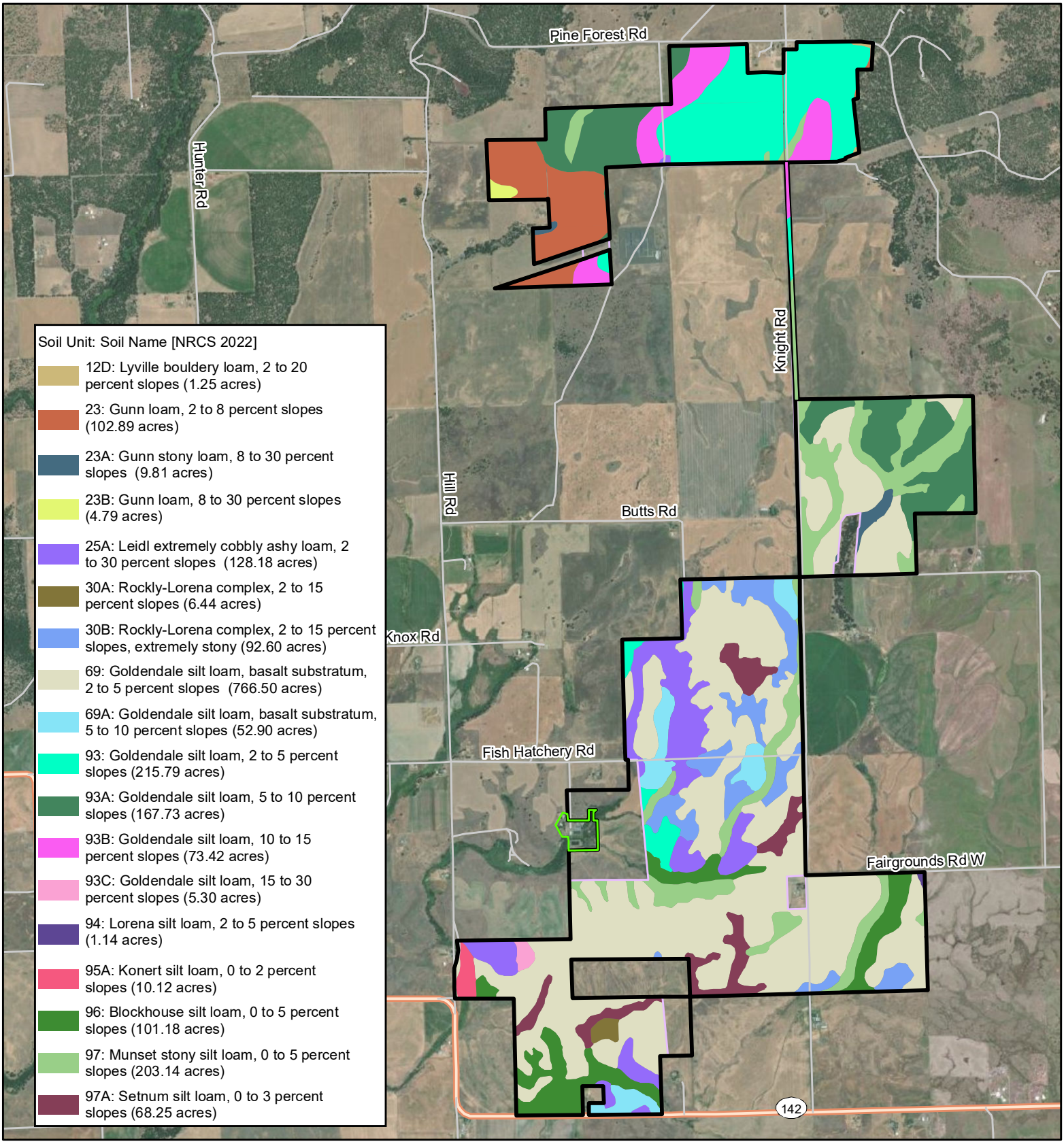

Project Lease Boundary
Project Survey Area
Goldendale Fish Hatchery
State Route
Local Road

N

0 2,000 4,000
Feet

Figure 2
Soils Mapped within the Project Survey Area

Carriger Solar, LLC Project
Klickitat County, WA

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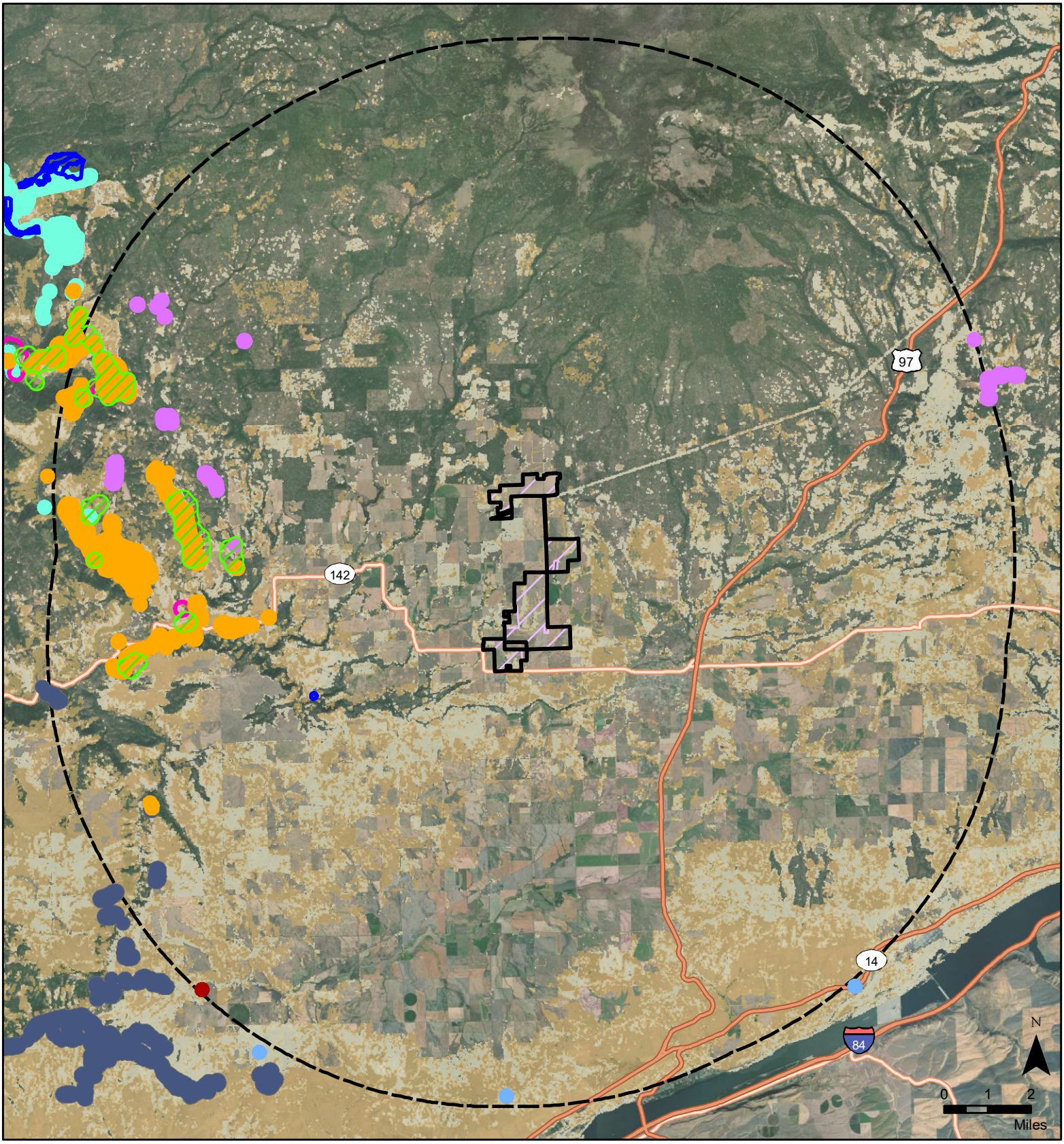

Project Lease Boundary
10-mile Buffer
Project Survey Area
WDFW Eastside Steppe
WDFW Shrub-steppe

WNHP Rare Plant Occurrence
Baker's linanthus *(Leptosiphon bolanderi)*
Barrett's beardtongue *(Penstemon barrettiae)*
Common bluecup *(Githopsis specularioides)*
Foxtail mousetail *(Myosurus alopecuroides)*
Long-bearded mariposa lily *(Calochortus longebarbatus var. longebarbatus)*
Obscure buttercup *(Ranunculus triternatus)*
Ribseed biscuitroot *(Lomatium tamanitchii)*
Suksdorf's desert-parsley *(Lomatium suksdorfii)*

WNHP Rare/High Quality Ecological Community Occurrence
Douglas-fir / Oceanspray / Geyer's sedge Forest
Oregon White Oak - Ponderosa Pine Forest
Oregon White Oak Woodland
Highway
State Route

Figure 3
WNHP and WDFW Occurrences in the Vicinity of the Project

Carriger Solar, LLC Project
Klickitat County, WA

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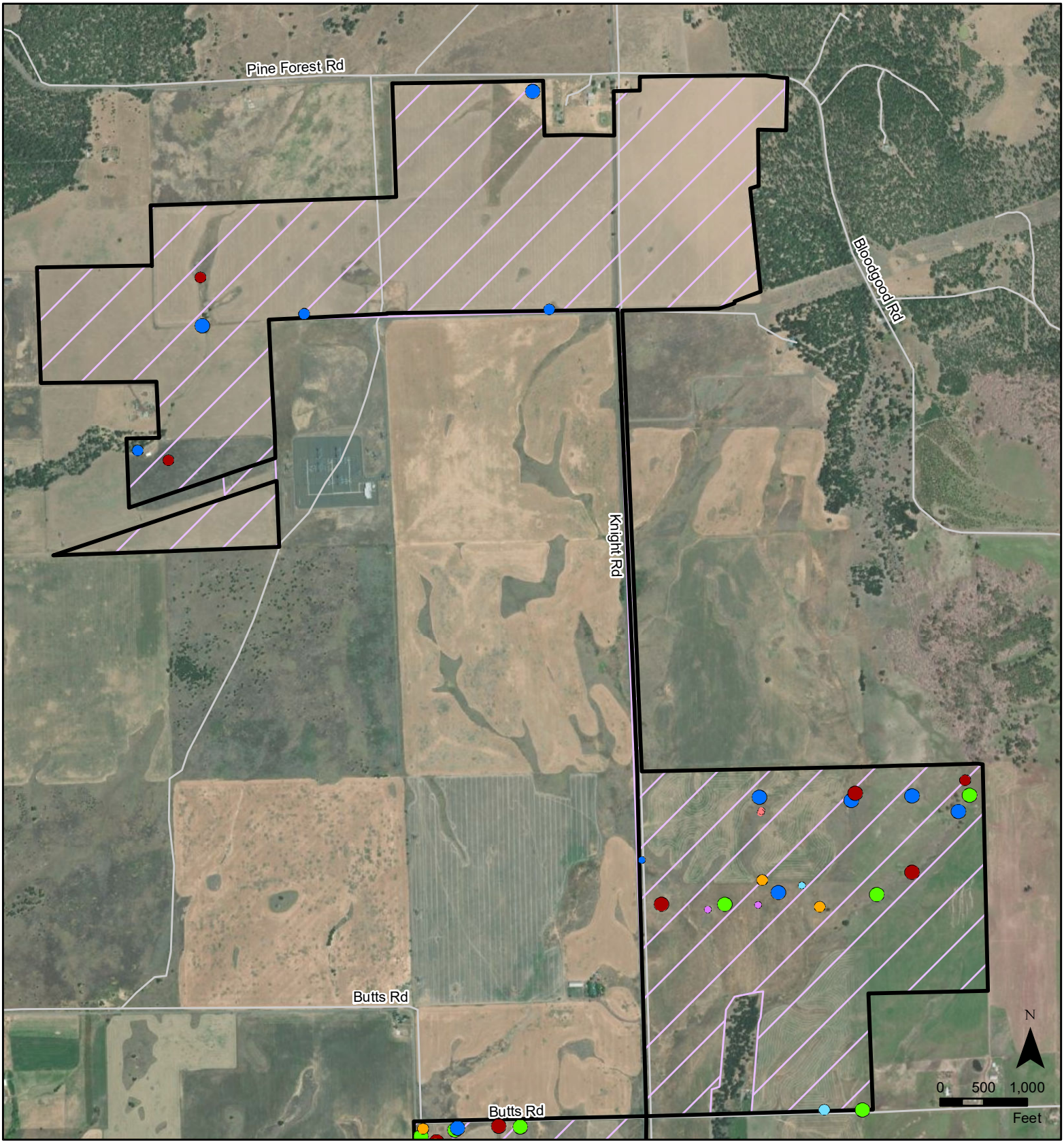

Project Lease Boundary
Project Survey Area
Goldendale Fish Hatchery
State Route
Local Road

Noxious Weed
Bull thistle *(Cirsium vulgare)*
Canada thistle *(Cirsium arvense)*
Cereal rye *(Secale cereale)*
Evergreen blackberry *(Rubus laciniatus)*
Field bindweed *(Convolvulus arvensis)*
Jointed goatgrass *(Aegilops cylindrica)*
Medusahead *(Taeniatherum caput-medusae)*
Reed canarygrass *(Phalaris arundinacea)*
Rush skeletonweed *(Chondrilla juncea)*
Sulphur cinquefoil *(Potentilla recta)*
Ventenata *(Ventenata dubia)*
Yellow toadflax *(Linaria vulgaris)*

Size of Infestation
< 0.1 acre
0.1-1 acre
1-5 acres

Figure 5
Noxious Weeds Observed within the Project Survey Area

Carriger Solar, LLC Project
Klickitat County, WA

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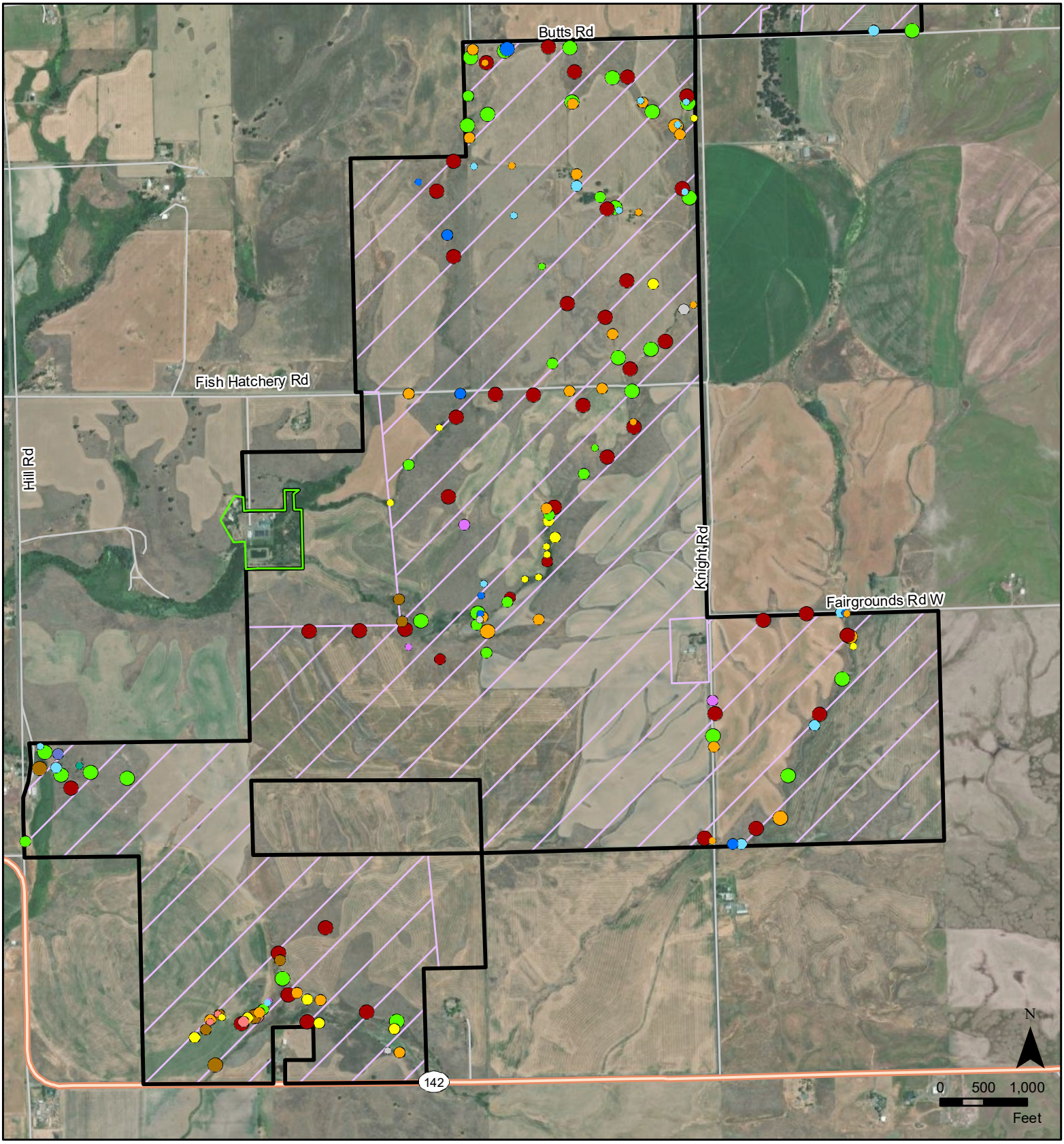

Project Lease Boundary
Project Survey Area
Goldendale Fish Hatchery
State Route
Local Road

Noxious Weed
Bull thistle *(Cirsium vulgare)*
Canada thistle *(Cirsium arvense)*
Cereal rye *(Secale cereale)*
Evergreen blackberry *(Rubus laciniatus)*
Field bindweed *(Convolvulus arvensis)*
Jointed goatgrass *(Aegilops cylindrica)*
Medusahead *(Taeniatherum caput-medusae)*
Reed canarygrass *(Phalaris arundinacea)*
Rush skeletonweed *(Chondrilla juncea)*
Sulphur cinquefoil *(Potentilla recta)*
Ventenata *(Ventenata dubia)*
Yellow toadflax *(Linaria vulgaris)*

Size of Infestation
< 0.1 acre
0.1-1 acre
1-5 acres

Figure 5
Noxious Weeds Observed within the Project Survey Area

Carriger Solar, LLC Project
Klickitat County, WA

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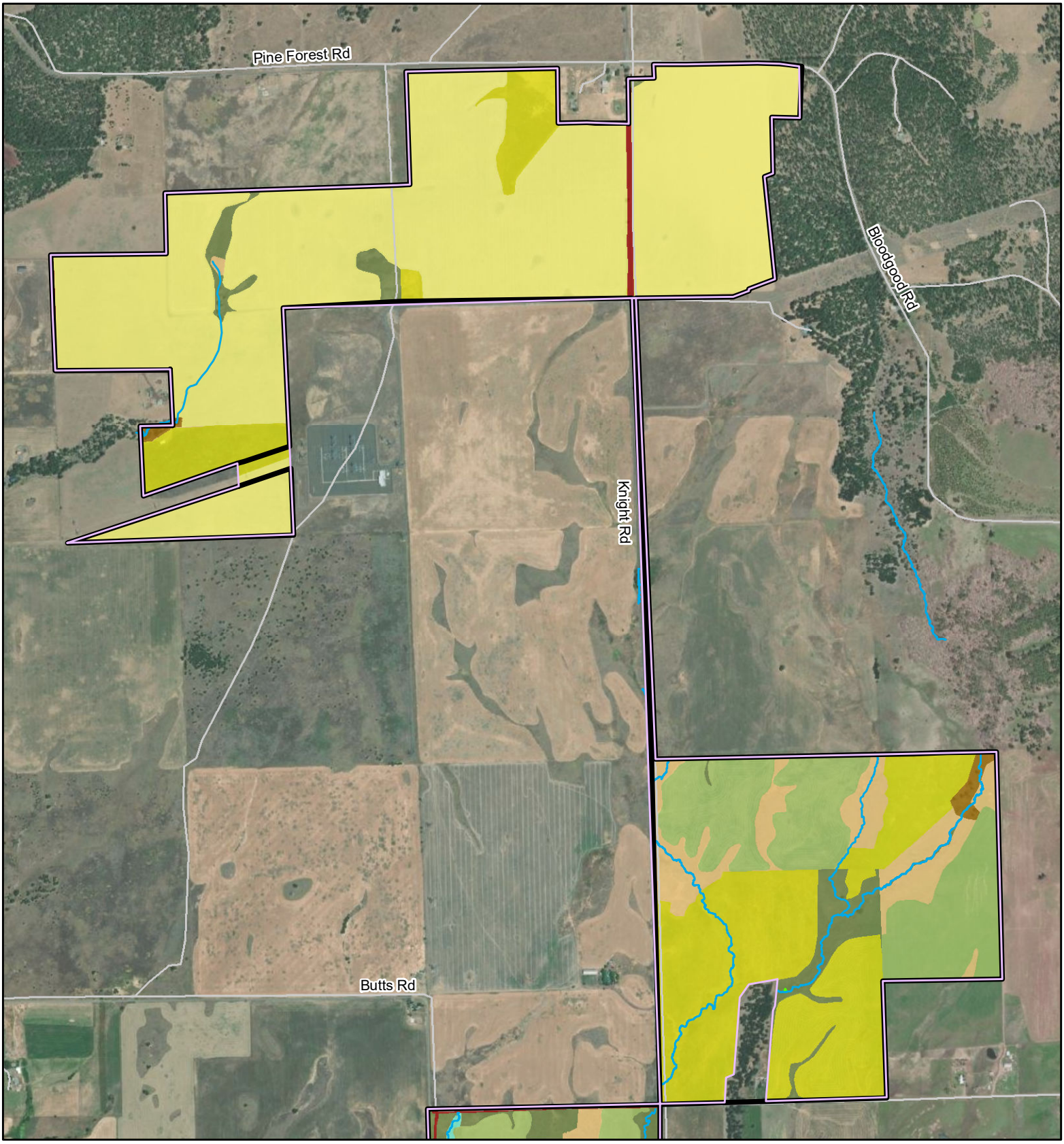

Project Lease Boundary
Project Survey Area
Goldendale Fish Hatchery
State Route
Local Road
Delineated Stream
Delineated Vernal Pool
Delineated Wetland

Field-delineated Vegetation Communities

Agriculture, Pasture, and Mixed Environs
- Cultivated Cropland
- Improved Pasture
- Unimproved Pasture
- Modified Grasslands

- Dwarf Shrub-steppe
- Eastside (Interior) Grasslands
- Eastside (Interior) Riparian-Wetlands
- Ponderosa Pine Forest and Woodlands (includes Eastside Oak)
- Urban and Mixed Environs

N

0 500 1,000
Feet

Figure 6
Vegetation Communities within the Project Survey Area

Carriger Solar, LLC Project
Klickitat County, WA

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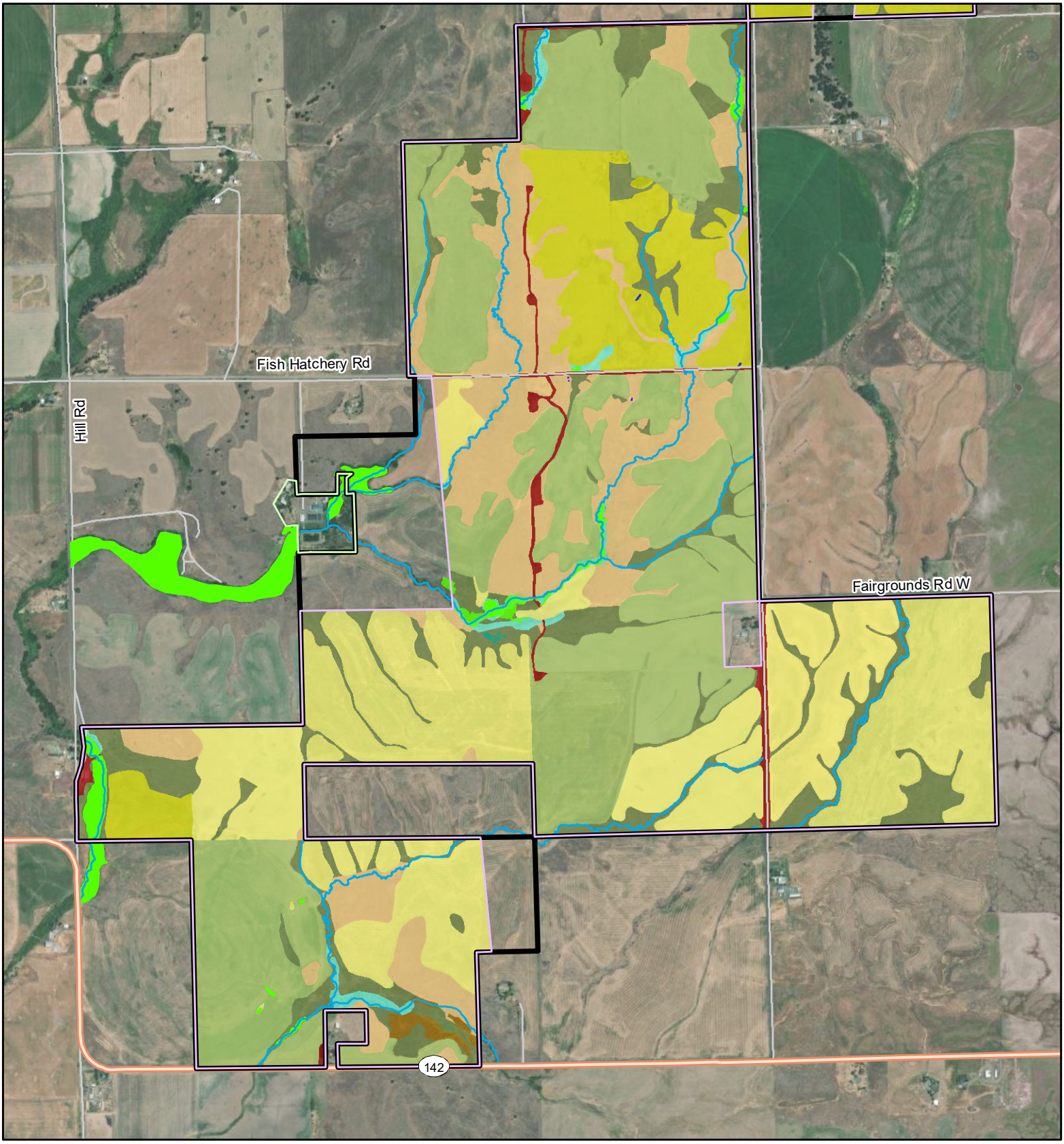

Project Lease Boundary
Project Survey Area
Goldendale Fish Hatchery
State Route
Local Road
Delineated Stream
Delineated Vernal Pool
Delineated Wetland

Field-delineated Vegetation Communities

Agriculture, Pasture, and Mixed Environs
- Cultivated Cropland
- Improved Pasture
- Unimproved Pasture
- Modified Grasslands

- Dwarf Shrub-steppe
- Eastside (Interior) Grasslands
- Eastside (Interior) Riparian-Wetlands
- Ponderosa Pine Forest and Woodlands (includes Eastside Oak)
- Urban and Mixed Environs

N

0 500 1,000
Feet

Figure 6
Vegetation Communities within the Project Survey Area

Carriger Solar, LLC Project
Klickitat County, WA

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Appendix A.

USDA NRCS Soil Resource Report for the Project Survey Area

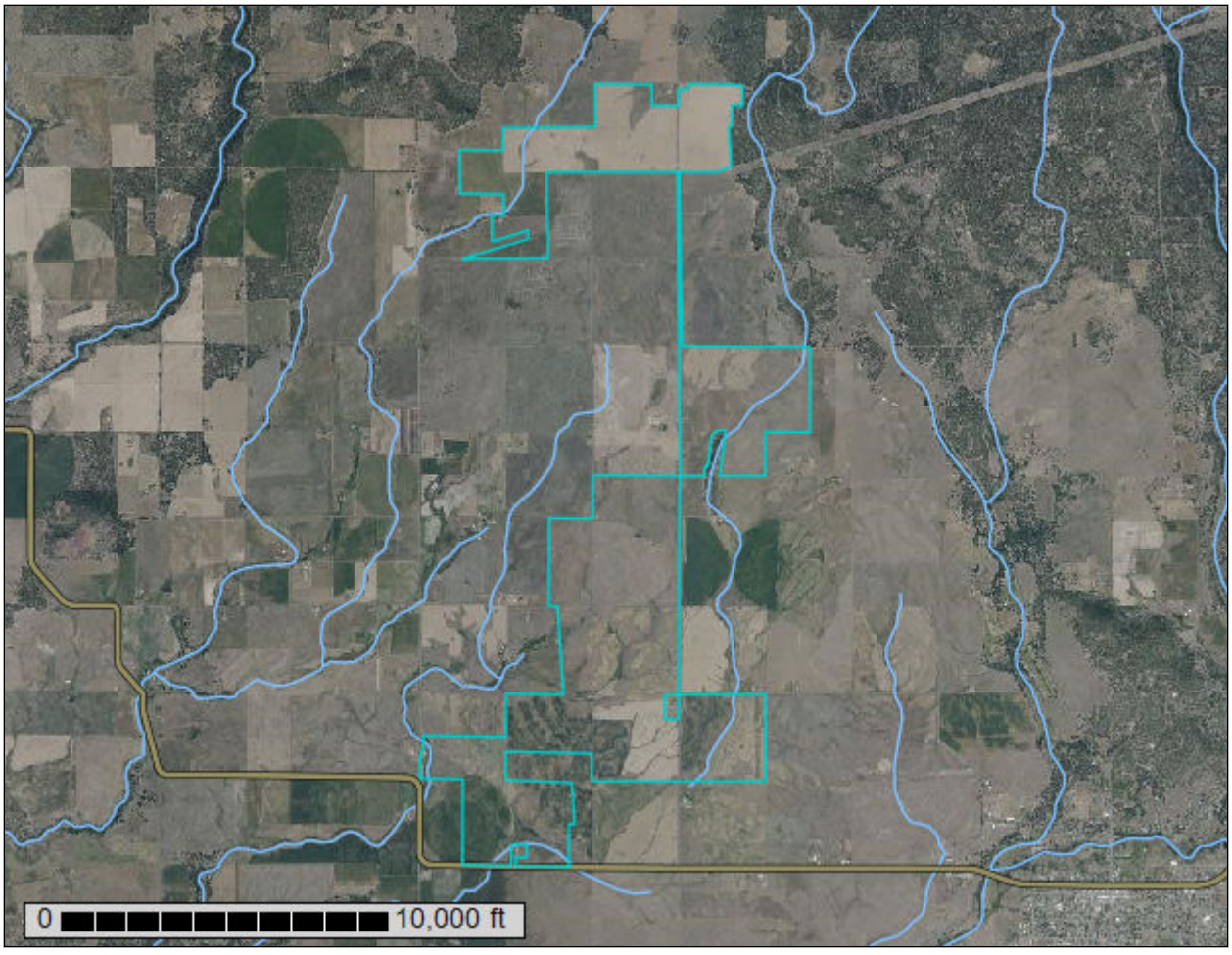
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Klickitat County Area, Washington



September 14, 2022

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

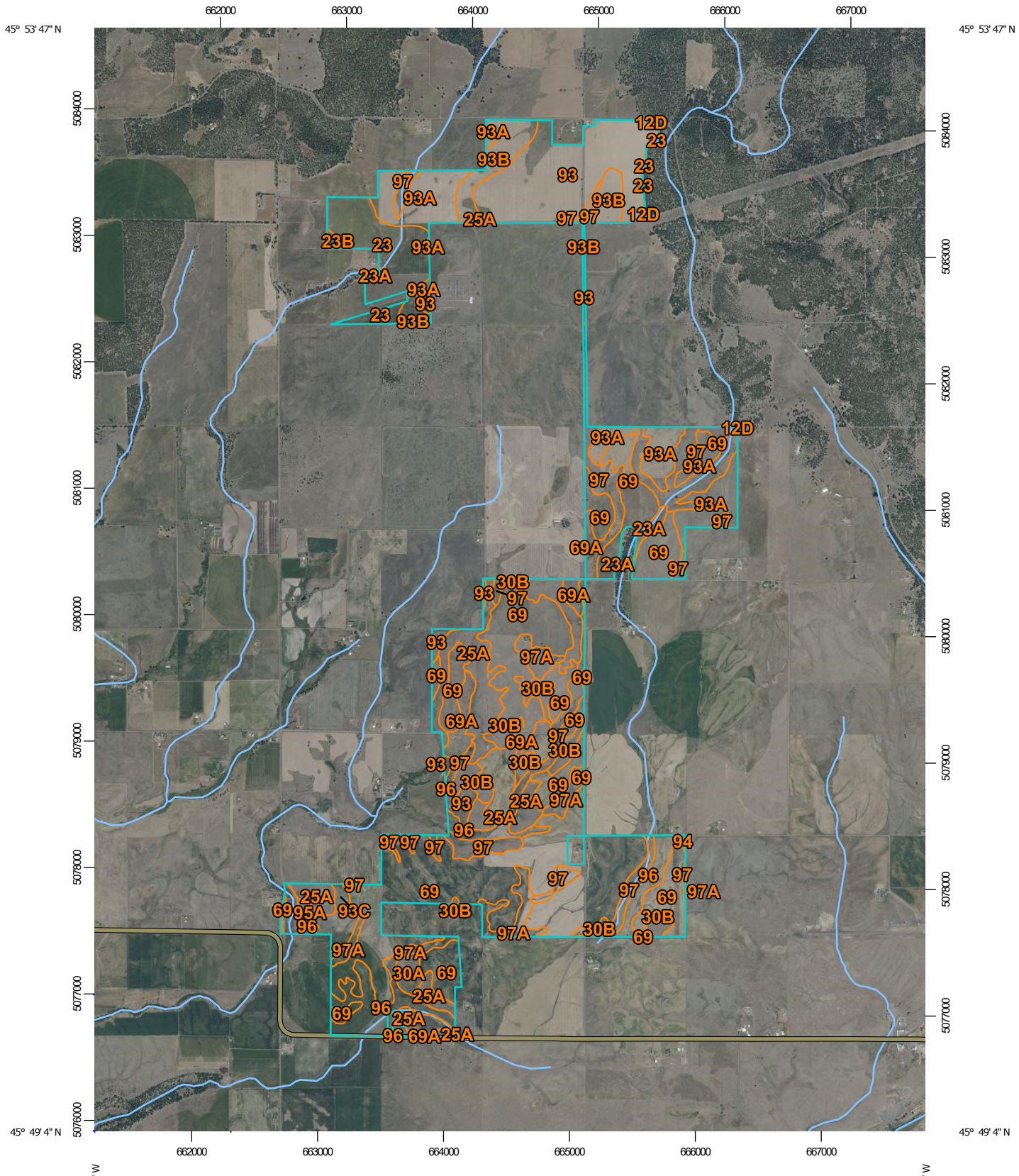
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map (Carriger Solar Project, LLC)



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Klickitat County Area, Washington
Survey Area Data: Version 16, Aug 31, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 1, 2020—Jun 2, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend (Carriger Solar Project, LLC)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
12D	Lyville bouldery loam, 2 to 20 percent slopes	1.2	0.1%
23	Gunn loam, 2 to 8 percent slopes	102.9	5.1%
23A	Gunn stony loam, 8 to 30 percent slopes	9.8	0.5%
23B	Gunn loam, 8 to 30 percent slopes	4.8	0.2%
25A	Leidl extremely cobbly ashy loam, 2 to 30 percent slopes	128.2	6.4%
30A	Rockly-Lorena complex, 2 to 15 percent slopes	6.4	0.3%
30B	Rockly-Lorena complex, 2 to 15 percent slopes, extremely stony	92.6	4.6%
69	Goldendale silt loam, basalt substratum, 2 to 5 percent slopes	771.6	38.3%
69A	Goldendale silt loam, basalt substratum, 5 to 10 percent slopes	52.9	2.6%
93	Goldendale silt loam, 2 to 5 percent slopes	215.8	10.7%
93A	Goldendale silt loam, 5 to 10 percent slopes	167.7	8.3%
93B	Goldendale silt loam, 10 to 15 percent slopes	73.4	3.6%
93C	Goldendale silt loam, 15 to 30 percent slopes	5.3	0.3%
94	Lorena silt loam, 2 to 5 percent slopes	1.1	0.1%
95A	Konert silt loam, 0 to 2 percent slopes	10.1	0.5%
96	Blockhouse silt loam, 0 to 5 percent slopes	101.2	5.0%
97	Munset stony silt loam, 0 to 5 percent slopes	203.2	10.1%
97A	Setnum silt loam, 0 to 3 percent slopes	68.3	3.4%
Totals for Area of Interest		**2,016.6**	**100.0%**

Map Unit Descriptions (Carriger Solar Project, LLC)

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the

basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Klickitat County Area, Washington

12D—Lyville bouldery loam, 2 to 20 percent slopes

Map Unit Setting

National map unit symbol: 2k7z
Elevation: 1,200 to 2,500 feet
Mean annual precipitation: 18 to 22 inches
Mean annual air temperature: 46 to 48 degrees F
Frost-free period: 100 to 140 days
Farmland classification: Not prime farmland

Map Unit Composition

Lyville and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lyville

Setting

Landform: Canyons
Parent material: Colluvium derived from basalt mixed with loess

Typical profile

H1 - 0 to 7 inches: bouldery loam
H2 - 7 to 13 inches: gravelly loam
H3 - 13 to 27 inches: gravelly loam
H4 - 27 to 44 inches: very gravelly loam
H5 - 44 to 48 inches: unweathered bedrock

Properties and qualities

Slope: 2 to 20 percent
Depth to restrictive feature: 40 to 60 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: B
Ecological site: F006XD004WA - Mesic Xeric Slopes and Plateaus (Oregon White Oak-Ponderosa pine Hot Dry Herb/Shrub)
Other vegetative classification: Oregon white oak/pinegrass-elksedge (HOG211)
Hydric soil rating: No

Minor Components

Gunn

Percent of map unit: 5 percent
Hydric soil rating: No

Maydol

Percent of map unit: 5 percent
Hydric soil rating: No

Nook

Percent of map unit: 5 percent
Hydric soil rating: No

23—Gunn loam, 2 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2k9t
Elevation: 300 to 2,700 feet
Mean annual precipitation: 18 to 25 inches
Mean annual air temperature: 46 to 50 degrees F
Frost-free period: 100 to 150 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Gunn and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Gunn

Setting

Landform: Plateaus
Parent material: Colluvium and residuum derived from basalt mixed with loess

Typical profile

H1 - 0 to 6 inches: loam
H2 - 6 to 18 inches: loam
H3 - 18 to 60 inches: clay loam

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.4 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: F006XD004WA - Mesic Xeric Slopes and Plateaus (Oregon White Oak-Ponderosa pine Hot Dry Herb/Shrub)

Other vegetative classification: Oregon white oak/pinegrass-elksedge (HOG211)
Hydric soil rating: No

Minor Components

Kiakus
Percent of map unit: 3 percent
Hydric soil rating: No

Itat
Percent of map unit: 2 percent
Hydric soil rating: No

23A—Gunn stony loam, 8 to 30 percent slopes

Map Unit Setting
National map unit symbol: 2k9w
Elevation: 500 to 2,700 feet
Mean annual precipitation: 18 to 25 inches
Mean annual air temperature: 46 to 50 degrees F
Frost-free period: 100 to 150 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Gunn and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Gunn

Setting
Landform: Hillslopes
Parent material: Colluvium and residuum derived from basalt mixed with loess

Typical profile
H1 - 0 to 5 inches: stony loam
H2 - 5 to 33 inches: loam
H3 - 33 to 60 inches: clay loam

Properties and qualities
Slope: 8 to 30 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.5 inches)

Interpretive groups
Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: F006XD004WA - Mesic Xeric Slopes and Plateaus (Oregon White Oak-Ponderosa pine Hot Dry Herb/Shrub)
Other vegetative classification: Oregon white oak/pinegrass-elksedge (HOG211)
Hydric soil rating: No

Minor Components

Kiakus
Percent of map unit: 5 percent
Hydric soil rating: No

Itat
Percent of map unit: 5 percent
Hydric soil rating: No

23B—Gunn loam, 8 to 30 percent slopes

Map Unit Setting
National map unit symbol: 2k9x
Elevation: 300 to 2,700 feet
Mean annual precipitation: 18 to 25 inches
Mean annual air temperature: 46 to 50 degrees F
Frost-free period: 100 to 150 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Gunn and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Gunn

Setting
Landform: Hillslopes
Parent material: Colluvium and residuum derived from basalt mixed with loess

Typical profile
H1 - 0 to 15 inches: loam
H2 - 15 to 32 inches: loam
H3 - 32 to 60 inches: clay loam

Properties and qualities
Slope: 8 to 30 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None

Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: F006XD004WA - Mesic Xeric Slopes and Plateaus (Oregon White Oak-Ponderosa pine Hot Dry Herb/Shrub)
Other vegetative classification: Oregon white oak/pinegrass-elksedge (HOG211)
Hydric soil rating: No

Minor Components

Wahoo

Percent of map unit: 5 percent
Hydric soil rating: No

Kiakus

Percent of map unit: 5 percent
Hydric soil rating: No

25A—Leidl extremely cobbly ashy loam, 2 to 30 percent slopes

Map Unit Setting

National map unit symbol: 2kbc
Elevation: 300 to 2,300 feet
Mean annual precipitation: 18 to 25 inches
Mean annual air temperature: 46 to 48 degrees F
Frost-free period: 100 to 140 days
Farmland classification: Not prime farmland

Map Unit Composition

Leidl and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Leidl

Setting

Landform: Plateaus
Parent material: Colluvium and residuum derived from basalt with an influence of volcanic ash and loess in the surface

Typical profile

H1 - 0 to 7 inches: extremely cobbly ashy loam
H2 - 7 to 24 inches: extremely gravelly clay loam
H3 - 24 to 28 inches: unweathered bedrock

Properties and qualities

Slope: 2 to 30 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock

Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 2.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C
Ecological site: R006XY203WA - COOL STONY 16-24 PZ
Hydric soil rating: No

Minor Components

Lorena

Percent of map unit: 5 percent
Hydric soil rating: No

Rockly

Percent of map unit: 5 percent
Hydric soil rating: No

30A—Rockly-Lorena complex, 2 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2kcs
Elevation: 1,300 to 2,900 feet
Mean annual precipitation: 15 to 18 inches
Mean annual air temperature: 46 to 50 degrees F
Frost-free period: 120 to 150 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Rockly and similar soils: 50 percent
Lorena and similar soils: 40 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rockly

Setting

Landform: Plateaus
Parent material: Colluvium derived from basalt mixed with loess and minor amounts of volcanic ash

Typical profile

H1 - 0 to 4 inches: very gravelly loam
H2 - 4 to 10 inches: extremely gravelly loam

H3 - 10 to 14 inches: unweathered bedrock

Properties and qualities

Slope: 2 to 15 percent
Surface area covered with cobbles, stones or boulders: 8.0 percent
Depth to restrictive feature: 5 to 12 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 0.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: R006XY301WA - VERY SHALLOW 16-24 PZ
Hydric soil rating: No

Description of Lorena

Setting

Landform: Plateaus
Parent material: Slope alluvium and colluvium derived from basalt mixed with loess and minor amounts of volcanic ash

Typical profile

H1 - 0 to 11 inches: silt loam
H2 - 11 to 33 inches: silt loam
H3 - 33 to 37 inches: unweathered bedrock

Properties and qualities

Slope: 2 to 15 percent
Surface area covered with cobbles, stones or boulders: 8.0 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.4 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C
Ecological site: R008XY103WA - COOL LOAMY 10-16 PZ
Hydric soil rating: No

Minor Components

Rock outcrop

Percent of map unit: 5 percent
Hydric soil rating: No

Kiakus

Percent of map unit: 5 percent
Hydric soil rating: No

30B—Rockly-Lorena complex, 2 to 15 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: 2kct
Elevation: 400 to 2,700 feet
Mean annual precipitation: 15 to 18 inches
Mean annual air temperature: 46 to 50 degrees F
Frost-free period: 120 to 150 days
Farmland classification: Not prime farmland

Map Unit Composition

Rockly and similar soils: 50 percent
Lorena and similar soils: 40 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rockly

Setting

Landform: Plateaus
Parent material: Colluvium derived from basalt mixed with loess and minor amounts of volcanic ash

Typical profile

H1 - 0 to 4 inches: very gravelly loam
H2 - 4 to 10 inches: extremely gravelly loam
H3 - 10 to 14 inches: unweathered bedrock

Properties and qualities

Slope: 2 to 15 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 5 to 12 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 0.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: R006XY301WA - VERY SHALLOW 16-24 PZ

Hydric soil rating: No

Description of Lorena

Setting

Landform: Plateaus
Parent material: Slope alluvium and colluvium derived from basalt mixed with loess and minor amounts of volcanic ash

Typical profile

H1 - 0 to 17 inches: silt loam
H2 - 17 to 32 inches: silt loam
H3 - 32 to 36 inches: unweathered bedrock

Properties and qualities

Slope: 2 to 15 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.0 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C
Ecological site: R008XY103WA - COOL LOAMY 10-16 PZ
Hydric soil rating: No

Minor Components

Kiakus

Percent of map unit: 5 percent
Hydric soil rating: No

Rock outcrop

Percent of map unit: 5 percent
Hydric soil rating: No

69—Goldendale silt loam, basalt substratum, 2 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2kjf
Elevation: 1,400 to 2,700 feet
Mean annual precipitation: 15 to 18 inches
Mean annual air temperature: 46 to 50 degrees F
Frost-free period: 120 to 150 days

Farmland classification: All areas are prime farmland

Map Unit Composition

Goldendale, basalt substratum, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Goldendale, Basalt Substratum

Setting

Landform: Plateaus
Parent material: Loess mixed with slope alluvium, colluvium and residuum derived from basalt with minor amounts of volcanic ash

Typical profile

H1 - 0 to 10 inches: silt loam
H2 - 10 to 15 inches: silt loam
H3 - 15 to 45 inches: clay loam
H4 - 45 to 49 inches: unweathered bedrock

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: 40 to 60 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.8 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: R006XY102WA - LOAMY 16-24 PZ
Hydric soil rating: No

Minor Components

Blockhouse

Percent of map unit: 5 percent
Hydric soil rating: No

Leidl

Percent of map unit: 5 percent
Hydric soil rating: No

Lorena

Percent of map unit: 5 percent
Hydric soil rating: No

69A—Goldendale silt loam, basalt substratum, 5 to 10 percent slopes

Map Unit Setting

National map unit symbol: 2kjg
Elevation: 1,400 to 2,700 feet
Mean annual precipitation: 15 to 18 inches
Mean annual air temperature: 46 to 50 degrees F
Frost-free period: 120 to 150 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Goldendale, basalt substratum, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Goldendale, Basalt Substratum

Setting

Landform: Plateaus
Parent material: Loess mixed with slope alluvium, colluvium and residuum derived from basalt with minor amounts of volcanic ash

Typical profile

H1 - 0 to 10 inches: silt loam
H2 - 10 to 15 inches: silt loam
H3 - 15 to 45 inches: clay loam
H4 - 45 to 49 inches: unweathered bedrock

Properties and qualities

Slope: 5 to 10 percent
Depth to restrictive feature: 40 to 60 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.8 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: R006XY102WA - LOAMY 16-24 PZ
Hydric soil rating: No

Minor Components

Leidl

Percent of map unit: 5 percent

Hydric soil rating: No

Blockhouse

Percent of map unit: 5 percent
Hydric soil rating: No

Lorena

Percent of map unit: 5 percent
Hydric soil rating: No

93—Goldendale silt loam, 2 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2kns
Elevation: 1,500 to 2,600 feet
Mean annual precipitation: 15 to 18 inches
Mean annual air temperature: 46 to 50 degrees F
Frost-free period: 120 to 150 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Goldendale and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Goldendale

Setting

Landform: Plateaus
Parent material: Loess mixed with slope alluvium, colluvium and residuum derived from basalt with minor amounts of volcanic ash

Typical profile

H1 - 0 to 14 inches: silt loam
H2 - 14 to 20 inches: silt loam
H3 - 20 to 60 inches: clay loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.7 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B

Ecological site: R006XY102WA - LOAMY 16-24 PZ
Hydric soil rating: No

Minor Components

Lorena
Percent of map unit: 5 percent
Hydric soil rating: No

Blockhouse
Percent of map unit: 5 percent
Hydric soil rating: No

93A—Goldendale silt loam, 5 to 10 percent slopes

Map Unit Setting
National map unit symbol: 2knw
Elevation: 1,500 to 2,600 feet
Mean annual precipitation: 15 to 18 inches
Mean annual air temperature: 46 to 50 degrees F
Frost-free period: 120 to 150 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Goldendale and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Goldendale

Setting
Landform: Plateaus
Parent material: Loess mixed with slope alluvium, colluvium and residuum derived from basalt with minor amounts of volcanic ash

Typical profile
H1 - 0 to 14 inches: silt loam
H2 - 14 to 20 inches: silt loam
H3 - 20 to 60 inches: clay loam

Properties and qualities
Slope: 5 to 10 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.7 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: R006XY102WA - LOAMY 16-24 PZ
Hydric soil rating: No

Minor Components

Lorena

Percent of map unit: 5 percent
Hydric soil rating: No

Blockhouse

Percent of map unit: 5 percent
Hydric soil rating: No

93B—Goldendale silt loam, 10 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2knx
Elevation: 1,500 to 2,600 feet
Mean annual precipitation: 15 to 18 inches
Mean annual air temperature: 46 to 50 degrees F
Frost-free period: 120 to 150 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Goldendale and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Goldendale

Setting

Landform: Hillslopes
Parent material: Loess mixed with slope alluvium, colluvium and residuum derived from basalt with minor amounts of volcanic ash

Typical profile

H1 - 0 to 14 inches: silt loam
H2 - 14 to 20 inches: silt loam
H3 - 20 to 60 inches: clay loam

Properties and qualities

Slope: 10 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches

Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.7 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: R006XY102WA - LOAMY 16-24 PZ
Hydric soil rating: No

Minor Components

Lorena

Percent of map unit: 5 percent
Hydric soil rating: No

93C—Goldendale silt loam, 15 to 30 percent slopes

Map Unit Setting

National map unit symbol: 2kny
Elevation: 600 to 3,000 feet
Mean annual precipitation: 15 to 18 inches
Mean annual air temperature: 46 to 50 degrees F
Frost-free period: 120 to 150 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Goldendale and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Goldendale

Setting

Landform: Hillslopes
Parent material: Loess mixed with slope alluvium, colluvium and residuum derived from basalt with minor amounts of volcanic ash

Typical profile

H1 - 0 to 14 inches: silt loam
H2 - 14 to 20 inches: silt loam
H3 - 20 to 60 inches: clay loam

Properties and qualities

Slope: 15 to 30 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches

Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: R006XY102WA - LOAMY 16-24 PZ
Hydric soil rating: No

Minor Components

Lorena

Percent of map unit: 5 percent
Hydric soil rating: No

94—Lorena silt loam, 2 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2kp0
Elevation: 1,400 to 2,700 feet
Mean annual precipitation: 15 to 18 inches
Mean annual air temperature: 46 to 50 degrees F
Frost-free period: 120 to 150 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Lorena and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lorena

Setting

Landform: Plateaus
Parent material: Slope alluvium and colluvium derived from basalt mixed with loess and minor amounts of volcanic ash

Typical profile

H1 - 0 to 16 inches: silt loam
H2 - 16 to 31 inches: silt loam
H3 - 31 to 36 inches: silt loam
H4 - 36 to 40 inches: unweathered bedrock

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)

Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.5 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: C
Ecological site: R008XY103WA - COOL LOAMY 10-16 PZ
Hydric soil rating: No

Minor Components

Rockly

Percent of map unit: 5 percent
Hydric soil rating: No

Leidl

Percent of map unit: 5 percent
Hydric soil rating: No

95A—Konert silt loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2kpb
Elevation: 1,500 to 2,000 feet
Mean annual precipitation: 15 to 22 inches
Mean annual air temperature: 46 to 48 degrees F
Frost-free period: 90 to 120 days
Farmland classification: Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Konert and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Konert

Setting

Landform: Flood plains
Parent material: Alluvium

Typical profile

H1 - 0 to 17 inches: silt loam
H2 - 17 to 60 inches: silty clay

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 8 to 17 inches
Frequency of flooding: FrequentNone
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: C/D
Ecological site: R009XY601WA - WET MEADOW 16-24 PZ
Hydric soil rating: Yes

Minor Components

Munset

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

96—Blockhouse silt loam, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2kpc
Elevation: 1,400 to 2,200 feet
Mean annual precipitation: 15 to 18 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 120 to 150 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Blockhouse and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Blockhouse

Setting

Landform: Swales
Parent material: Alluvium

Typical profile

H1 - 0 to 12 inches: silt loam
H2 - 12 to 29 inches: silty clay loam
H3 - 29 to 60 inches: clay loam

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 44 to 72 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.7 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: R009XY402WA - LOAMY BOTTOM 16-24 PZ
Hydric soil rating: No

Minor Components

Munset

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

97—Munset stony silt loam, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2kpj
Elevation: 1,400 to 2,400 feet
Mean annual precipitation: 15 to 18 inches
Mean annual air temperature: 46 to 50 degrees F
Frost-free period: 120 to 150 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Munset and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Munset

Setting

Landform: Plateaus
Parent material: Alluvium mixed with loess and residuum derived from basalt

Typical profile

H1 - 0 to 2 inches: stony silt loam
H2 - 2 to 16 inches: silty clay loam
H3 - 16 to 22 inches: gravelly clay
H4 - 22 to 25 inches: extremely gravelly sandy clay loam
H5 - 25 to 35 inches: unweathered bedrock

Properties and qualities

Slope: 0 to 5 percent

Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to low (0.00 to 0.01 in/hr)
Depth to water table: About 0 to 2 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Available water supply, 0 to 60 inches: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6w
Hydrologic Soil Group: D
Ecological site: R009XY601WA - WET MEADOW 16-24 PZ
Hydric soil rating: Yes

Minor Components

Lorena

Percent of map unit: 5 percent
Hydric soil rating: No

Rockly

Percent of map unit: 5 percent
Hydric soil rating: No

97A—Setnum silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2kpm
Elevation: 1,400 to 3,600 feet
Mean annual precipitation: 15 to 18 inches
Mean annual air temperature: 46 to 50 degrees F
Frost-free period: 110 to 150 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Setnum and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Setnum

Setting

Landform: Plateaus
Parent material: Alluvium derived from basalt mixed with loess

Typical profile

H1 - 0 to 10 inches: silt loam
H2 - 10 to 17 inches: silt loam
H3 - 17 to 31 inches: clay

H4 - 31 to 39 inches: clay loam
H5 - 39 to 43 inches: unweathered bedrock

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 10 to 17 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.9 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: D
Ecological site: R009XY601WA - WET MEADOW 16-24 PZ
Hydric soil rating: No

Minor Components

Blockhouse

Percent of map unit: 5 percent
Hydric soil rating: No

Munset

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

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Appendix B.

Rare Vascular Plant Species with Potential to Occur within the Project Survey Area

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

Scientific name **(Common Name)**	**Status**[1]	**Habitat Characteristics/ Identifying Features**[2]	**Potential to Occur in Project Survey Area**[3]	**Survey Period**
Agoseris elata (tall agoseris)	S	Meadows, prairies, open woods, and exposed rocky ridge tops on various slope aspects, from low elevations to timberline; Associated species vary depending on elevation and whether the site is on the east side of the Cascades. The vegetation is generally dominated by herbaceous species. Elev. 500 to 7,800 feet.	Unlikely; only known occurrences in Klickitat County are historical.	June – August
Ammania robusta (grand redstem)	S	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*. Elev. 130 to 745 feet.	Highly Unlikely; known occurrence in Klickitat County is a historical record along the Columbia River.	May – June
Aphyllon californicum ssp. *grayanum* (syn. *Orobanche californica*) (California broomrape)	E	Vernally moist meadows; parasitic on *Symphyotrichum, Erigeron*, and related Asteraceae species. Most common in lower montane meadows, but occasionally found at or near sea level. Elev. near sea level to 1,500 feet.	Low; limited suitable habitat likely present within the Project Survey Area.	June – August
Artemisia campestris var. *wormskioldii* (Wormskiold's northern wormwood)	E	Arid shrub steppe habitats on basalt, compacted cobble, and shifting sand, usually on relatively flat terrain within the floodplain of the Columbia River. Associated species include *Artemisia campestris* var. *scouleriana*, *A. ludoviciana, Phacelia hastata, Rumex venosus, Lupinus polyphyllus*, *Eriogonum compositum*, *Sisymbrium altissimum*, *Penstemon acuminatus,* and *Centaurea diffusa*. Elev. 180 to 550 feet.	Highly Unlikely; only known from two disjunct sites along the Columbia River.	April – May
Astragalus arrectus (Palouse milk-vetch)	T	Grassy hillsides, sagebrush flats, river bluffs, and grassy or shrub-dominated openings of *Pinus ponderosa* and *Pseudotsuga menziesii* forests. Soils range from rocky and dry to moist and rich. Associated species include: *Holodiscus discolor, Symphoricarpos albus, Purshia tridentata*, *Pseudoroegneria spicata, Brodiaea douglasii*, *Balsamorhiza sagittata*, and *Lupinus* spp. Elev. 1,000 to 2,900 feet.	Unlikely; known occurrences in Klickitat County are historical and records of these historical occurrences may be misidentifications.	Late April – early July
Astragalus diaphanous (transparent milk vetch)	X	Sandy or gravelly soils on gravel bars, alluvial slopes, and overlying basaltic rocks. Elev. 150 to 4,000 feet.	Highly Unlikely; currently believed to be extirpated in Washington.	May – June
Astragalus misellus var. *pauper* (pauper milk-vetch)	T	Open ridgetops and gently upper slopes, rarely middle and lower slopes, mostly along western margin of the Columbia Basin province. Associated species include *Artemisia rigida*, *A. tridentata, Crepis atribarba, C. occidentalis, Eriogonum sphaerocephalum*, *Pseudoroegneria spicata, Poa secunda* subsp. *secunda*, *Astragalus purshii*., *Erigeron linearis*, *Lomatium macrocarpum*, *Phlox longifolia*, and *P. hoodii*. Elev. 500 to 3,280 feet.	Low to moderate; suitable habitat may occur within Project Survey Area.	Flowers April – mid-May Fruits mature by late June
Astragalus pulsiferae var. *suksdorfii* (Ames' milk-vetch)	E	Open *Pinus ponderosa* forests with *Purshia tridentata*, on generally flat or very gentle terrain in coarse-textured substrates. Occurs in forests which are subject to periodic fire, but plant's microsites are not densely vegetated, so fires may be low intensity at ground level. Also occurs on disturbed ground, such as dirt roads. Elev. 1,850 to 1,980 feet.	Low; limited suitable habitat likely present within Project Survey Area.	May - July
Bergia texana (Texas bergia)	X	Muddy or sandy shores and flats along rivers, lakes, reservoirs, and ponds. Elev. 40-130-600 feet.	Highly Unlikely; believed to be extirpated in Washington.	June – September

Scientific name **(Common Name)**	**Status**[1]	**Habitat Characteristics/ Identifying Features**[2]	**Potential to Occur in Project Survey Area**[3]	**Survey Period**
Blitum spathulatum (prostrate povertyweed)	S	Moist streambanks and meadows, often associated with alkaline soils (Holmgren et al. 2012). In Washington, the population in Okanogan County is found in a seasonally flooded swale with alkaline soil. Occurs with Great Basin wildrye (*Leymus cinereus*) and larkspur (*Delphinium* spp.). Elev. 200-2,160 feet.	Highly Unlikely; known occurrence in Klickitat County is historical and suitable habitat unlikely to be present within Project Survey Area.	June - July
Boechera atrorubens (redblack rockcress)	E	Rocky sagebrush slopes and rimrock and vernally moist swales with camas. Elev. 1,700 to 2,500 feet.	Low; limited suitable habitat likely present within the Project Survey Area.	April – May (June)
Bolandra oregana (Oregon bolandra)	T	Low-elevation sites along the Columbia River; usually near streams or on cliffs near waterfalls in moist, wooded, rocky places in deep shade. Has also been found in open, rocky areas and steep grassy, semi-open slopes. One of the Washington populations occurs on basalt scabland in vernally damp areas. Associated species include *Alnus rubra, Arnica amplexicaulis, Cystopteris fragilis, Dodecatheon dentatum, Mimulus guttatus, Montia parviflora, Saxifraga occidentalis*, and mosses. Elev. 60 to 3,900 feet.	Highly Unlikely; known occurrence in Klickitat County is historical and suitable habitat unlikely to be present within Project Survey Area.	May – June
Calochortus longebarbatus var. *longebarbatus* (long-bearded sego lily)	S	Open areas in vernally moist meadows, forest-meadow edges, and semi-open areas within coniferous woods. Sites are flat to gently sloped and dominated by grasses and forbs. Sometimes found in disturbed sites, such as roadsides and timber harvest units. Associated species include *Pinus ponderosa, Pseudotsuga menziesii, Spiraea douglasii, Allium* spp., *Deschampsia cespitosa, Danthonia californica, and Lomatium nudicaule.* Elev. 1,800 to 3,000 feet.	Low; limited suitable habitat likely present within Project Survey Area.	June – July
Camassia cusickii (Cusick's camas)	S	Moist slopes and seeps, often montane and basalt cliffs associated with seeps at an elevation of approximately 500 feet. Associated species include: *Erythranthe nasuta, Lomatium grayi, Toxicodendron* spp., *Salix lasiolepis, Acer macrophyllum, Quercus garryana,* and *Pinus ponderosa.*	Unlikely; suitable habitat not likely present within Project Survey Area.	April (May) – June (July)
Cirsium remotifolium var. *remotifolium* (weak thistle)	E	Moist meadows, streamsides, rock outcrops, prairies, and transition zone between forests and meadows or balds. Elev. 50-3,000 feet.	Unlikely; known occurrence in Klickitat County is historical.	June – September
Collinsia sparsiflora var. *sparsiflora* (few-flowered blue-eyed Mary; few-flowered collinsia)	S	Thin soils over basalt on almost flat to steep, generally south-facing slopes; in areas that are moist in spring, but becoming dry by summer. In Washington, grows in the transition zone between Eastern Cascades and Columbia Basin physiographic provinces. Microsites are usually open with a dense herb layer, but plant is also found in open stands of *Pinus ponderosa* and *Quercus garryana.* Associated species include *Quercus garryana, Pinus ponderosa, Balsamorhiza sagittata, Lomatium* spp., *Lithophragma* spp., and *Olsynium douglasii.* Elev. 200 to 1,200 feet.	Low; limited suitable habitat likely present within Project Survey Area; known occurrences in Klickitat County are from the Columbia River Gorge.	Mid-March - April
Corispermum villosum (hairy bugseed)	S	Shifting sand dunes with sand derived from coarse basalt, with scattered shrubs or bunchgrasses and vegetative cover of less than 10%. Occurs with *Achnatherum hymenoides, Ambrosia acanthicarpa, Abronia mellifera, Astragalus succumbens, Cryptantha leucophaea, Dieteria canescens, Heliotropium curassavicum, Leymus flavescens, Phacelia hastata,* and *Ladeania lanceolata* or *Psoralidium lanceolatum*. Elev. 450-1,140 feet.	Highly Unlikely; known occurrence in Klickitat County is historical and suitable habitat unlikely to be present within Project Survey Area.	July - October
Crepis bakeri (Idaho hawksbeard)	S	Bluebunch wheatgrass grasslands on rocky slopes with basalt outcrops (may also be on calcareous soils), roadside ditches and shoulders in Bluebunch wheatgrass-Idaho fescue grasslands, and hawthorn and willow thickets along streams. Elev. 2,230-6,235 feet.	Low; limited suitable habitat likely present within Project Survey Area.	May - June

Scientific name **(Common Name)**	**Status**[1]	**Habitat Characteristics/ Identifying Features**[2]	**Potential to Occur in Project Survey Area**[3]	**Survey Period**
Cryptantha rostellata (beaked cryptantha)	S	Very dry microsites on coarse substrate generally in shrub-steppe communities; usually found in scattered patches of a few individuals along dry, open drainages. Associated species include: *Artemisia tridentata, A. rigida, Purshia tridentata*, *Ribes cereum*, *Salvia dorrii*, *Bromus tectorum, Poa bulbosa, P. secunda, Pseudoroegneria spicata, Balsamorhiza careyana*, *Blepharipappus scaber*, *Collomia grandiflora*, *Cryptantha pterocarya*, *Pectocarya setosa*, *Phacelia linearis*, *Lithophragma* sp., *Lomatium grayi*, and *Scutellaria angustifolia*. Elev. 600 to 2,900 feet.	Low; limited suitable habitat likely present within Project Survey Area.	Late April – mid June
Cryptantha spiculifera (Snake River cryptantha)	S	Dry, open, flat, or sloping areas in stable or stony soils, with low vegetative cover. Associated species include *Artemisia rigida*, *A. tridentata*, *Ericameria nauseosa*, *Eriogonum sphaerocephalum*, *Salvia dorrii*, *Lupinus sericeus*, *Pseudoroegneria spicata*, and *Poa secunda* subsp. *secunda.* Elev. 450 to 3,500 feet.	Low; limited suitable habitat likely present within Project Survey Area.	May – July
Cusikiella douglasii (Douglas' draba)	S	Windswept rocky ridges, granitic rock screes, loose volcanic hillsides, red barren hills, rocky flats and serpentine ridges. In Washington, found on open rocky ridges on thin sandy to gravelly soil over basalt. Associated species include: *Eriogonum douglasii, Phlox hoodii, Phlox speciosa, Lupinus* spp., and *Lomatium* spp. Elev. 2,600 to 2,800 feet.	Low; limited suitable habitat likely present within Project Survey Area.	April – June
Damasonium californicum (fringed water-plantain)	S	In Washington, found in shallow ponds on basalt scabland, where it occurs with *Alisma plantago-aquatica, Ranunculus aquatilis, Downingia yina, Erythranthe guttata, Veronica* spp., and *Juncus* spp. (Camp and Gamon 2011). Elev. 200-235 feet. Elsewhere in its range, it occurs on damp ground, in and near water of sloughs, ditches, marshy fields, vernal pools, or banks of intermittent streams (Hitchcock and Cronquist 2018).	Unlikely; suitable habitat not likely present within Project Survey Area.	June – July
Diplacus cusickioides (Cusick's monkeyflower)	S	Arid regions, including bottomlands, basalt-derived scree in hot canyon bottoms, volcanic pumice, and sand dunes. Associated species include: *Eriogonum compositum, Physaria oregana, Chaenactis douglasii,* and *Diplacus nanus.* Elev. 75 to 1,120 feet.	Low; limited suitable habitat unlikely to occur within Project Survey Area.	Late May – June
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* subsp. *secunda*. Elev. 460 to 1,140 feet.	Unlikely; known occurrence in Klickitat County is historical.	April – early June
Eryngium petiolatum (Oregon coyote-thistle)	S	Obligate wetland species of wet prairies, swales, shallow ditches, and low ground, especially in places submerged in the spring and drier in the summer. Associated species include: various grasses, sedges (*Carex* spp.), rushes (*Juncus* spp.), *Plagiobothrys figuratus,* and *Ranunculus flammula.* Elev. 180 to 1,850 feet.	Low; limited suitable habitat likely present within Project Survey Area.	June – August
Erythranthe jungermannioides (liverwort monkeyflower)	X	Moist basalt crevices and seeps in vertical cliff faces and canyon walls; usually at low elevations and adjacent to major rivers in otherwise dry environments. Total vegetative cover is low; however, associates include: *Celtis laevigata* var. *reticulata*, *Philadelphus lewisii, Toxicodendron diversilobum, Cystopteris fragilis, Saxifraga odontoloma, Heuchera cylindrica,* and *Thelypodium laciniatum.*	Highly Unlikely; species is believed to be extirpated in Washington.	May – June
Erythranthe pulsiferae (Pulsifer's monkeyflower)	S	Seasonally wet or moist open areas; often in exposed mineral soil or in grass/forb openings in *Pinus ponderosa, Pseudotsuga menziesii,* and *Quercus garryana* forests. Found from valleys and foothills to middle elevations in the mountains. Associated species include: *Holodiscus discolor, Symphoricarpos albus, Arctostaphylos uva-ursi, Cryptantha* spp., *Myosotis* spp., *Epilobium* spp., *Potentilla* spp., *Heuchera* spp., and *Bromus tectorum.* Elev. 1,580 to 4,000 feet.	Unlikely to low; limited suitable habitat likely to occur within Project Survey Area.	April – July

Scientific name **(Common Name)**	**Status**[1]	**Habitat Characteristics/ Identifying Features**[2]	**Potential to Occur in Project Survey Area**[3]	**Survey Period**
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. In Washington, 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* spp., *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 to 7,100 feet.	Unlikely; known occurrence in Klickitat County is historical.	Mid-April – approx. June
Erythranthe washingtonensis (Washington monkeyflower)	S	Currently only known from northeast Oregon and adjacent Idaho. Historically known from riparian areas along the Columbia River in Washington. In Oregon, it is known from wet basaltic cobbles; historical Washington collections were found in low-elevation, wet, open places.	Unlikely; known occurrences in Klickitat County are historical.	May – September
Githopsis specularioides (common bluecup)	S	Dry, open places at lower elevations, such as thin soils over bedrock outcrops, grassy balds, talus slopes, and gravelly prairies; microsites are seasonally moist. Habitats are typically open but within or adjacent to forest. It survives best on relatively bare soil, where taller competing vegetation is absent or sparse. Associated species include *Pinus ponderosa, Pseudotsuga menziesii, Quercus garryana, Pseudoroegneria spicata, Festuca idahoensis,* and *Lomatium* spp. Elev. 200 to 2,500 feet.	Low; limited suitable habitat likely present within Project Survey Area.	Mid-April – mid-June
Hackelia diffusa var. *diffusa* (diffuse stickseed)	T	Bottoms of mossy talus and scree slopes, shaded areas, cliffs, roadsides, and other disturbed sites. Reported with *Pinus ponderosa, Pseudotsuga menziesii, Abies grandis, Acer glabrum* var. *douglasii,* and *Philadelphus lewisii.* Elev. 1,000 to 1,800 feet.	Low; limited suitable habitat likely present within Project Survey Area.	May – July
Isoetes nuttallii (Nutall's quillwort)	S	In seasonally wet ground, seepages, temporary streams, and mud near vernal pools. Associated species include: *Fraxinus latifolia, Malus fusca, Rosa nutkana, Spiraea douglasii, Deschampsia danthonioides, Poa bulbosa, Phalaris arundinacea, Camassia quamas, Leptosiphon bicolor, Saxifraga* spp., *Trifolium* spp., and rushes (*Juncus bufonius* and others). Documented elevations in Washington: 200 to 345 feet.	Low; limited suitable habitat likely present within Project Survey Area.	May - July
Juncus hemiendytus var. *hemiendytus* (dwarf rush)	S	Mud flats, edges of vernal pools, and moist to wet meadows. Washington occurrences are in vernal pools and vernally wet meadows at elevations of 2,300 to 2,430 feet. Associated species include: *Eleocharis macrostachya, Navarretia leucocephala* ssp. *minima, Plagiobothrys* spp., rushes (*Juncus bufonius, J. balticus*), *Phlox gracilis*, and *Deschampsia danthonioides.*	Low; limited suitable habitat likely present within Project Survey Area.	May – July
Juncus kelloggii (Kellogg's rush)	E	Sandy to clayey damp soils in a variety of habitats, such as vernal pools, seepage areas, and low spots in fields and meadows. Grows in habitats that are wet in the spring and completely dry in summer. Elev. 0 to 1,820 feet.	Low; limited suitable habitat likely present within Project Survey Area.	April – July
Juncus uncialis (inch-high rush)	T	Vernal pools and pond edges, often in channeled scablands, or biscuit-swale topography. Associated species include *Allium constrictum, Allium geyeri, Navarretia leucocephala, Plagiobothrys scouleri, P. stipitatus,* and *Polygonum polygaloides* ssp. *confertiflorum*. Elev. 300 to 2,500 feet.	Low; limited suitable habitat likely present within Project Survey Area.	May - June

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Lasthenia glaberrima (smooth goldfields)	S	Margins of vernal pools, wet or muddy stream banks, wetlands, and winter-flooded meadows. The extant Washington population grows around vernal ponds on basalt tablelands; the area is wet in winter and dries by late spring. Associated species include *Damasonium californicum, Downingia willamettensis, Eleocharis macrostachya, Epilobium pygmaeum, Isoetes nuttallii, Juncus uncialis, Polypogon monspeliensis,* and *Salix exigua.*	Low; limited suitable habitat likely present within Project Survey Area.	May – July
Leptosiphon bolanderi (Baker's linanthus)	S	Dry, rocky places and open or partially vegetated slopes with scattered basalt rocks. Usually on bare mineral soil with other annuals. Associated species include *Quercus garryana, Bromus tectorum, Pseudoroegneria spicata, Collinsia parviflora, Erodium cicutarium, Lithophragma parviflora, Lomatium grayi,* and *L. suksdorfii,* Elev. 850 to 1,800 feet.	Low; limited suitable habitat likely present within Project Survey Area.	April – May
Leymus flavescens (yellow wildrye)	E	Shifting sand dunes and disturbed sandy areas along ditches or road banks. Some populations are found along riverbanks (Fertig and Kleinknecht 2020). Associated species include *Achnatherum hymenoides, Bromus tectorum, Camissonia contorta, Oenothera pallida,* and *Ladeania lanceolata (Psoralidium lanceolatum).* Elev. 130-2,465 feet.	Unlikely; known occurrences in Klickitat County are historical.	June – July
Liparis loeselii (bog twayblade)	S	Springs, bogs, wetlands, and wet sunny places in *Pseudotsuga menziesii* forests. Associated species include: *Alnus incana* ssp. *tenuifolia, Salix pedicellaris, Kalmia microphylla, Ophioglossum pusillum, Lysichiton americanus,* sedges (*Carex* spp.), *Drosera rotundifolia, Menyanthes trifoliata, Hypericum anagalloides, Comarum palustre,* rushes (*Juncus* spp.), and sphagnum moss (*Sphagnum* spp.).	Highly Unlikely; suitable habitat unlikely to be present within Project Survey Area.	July - August
Lipocarpha aristulata (awned halfchaff sedge)	S	Wet soil and mud, often comprised of fine sand and silt, in bottomlands, sandbars, beaches, shorelines, stream banks, ponds, and ditches. In Washington, 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.*	Highly Unlikely; known occurrence in Klickitat County is historical.	June - August
Lomatium klickitatense (Klickitat biscuitroot)	T	Found on roadcuts and cliffs of reddish-brown volcanic bedrock and adjacent west or south-facing weathered basalt clay or silty loam slopes and meadows with *Eriogonum compositum, Trifolium macrocephalum,* and *Achnatherum lemmonii* interspersed with *Quercus garryana* or *Pinus ponderosa* woodlands. *Lomatium klickitatense* can be the dominant plant species present at some meadow sites. This species may co-occur with *Lomatium nudicaule, L. tamanitchii, L. papilioniferum,* and *L. suksdorfii*. Elev. 85-1,850 feet.	Low to moderate; suitable habitat potentially present within Project Survey Area.	Fruits late-May – early-July (Mature fruits needed for identification)
Lomatium laevigatum (smooth desert-parsley)	T	Ledges and crevices of basalt cliffs along the Columbia River and adjacent rocky slopes of sagebrush steppe. Adapted to dry, rocky habitats, where it faces a minimal amount of competition. Associated species include: *Eriogonum compositum, Draba verna, Lomatium dissectum, L. grayi, Thelypodium laciniatum, Vulpia bromoides,* and *Bromus tectorum.* Elev. 180 to 960 feet.	Highly Unlikely; known range doesn't overlap the Project Survey Area.	April – May (June)
Lomatium suksdorfii (Suksdorf's biscuitroot)	S	Semi-open to open, dry, rocky hillsides on moderate to steep slopes. Vegetative cover is generally sparse. Grazing has occurred on, and degraded, virtually all known sites. Associated species include: *Pinus ponderosa, Quercus garryana, Toxicodendron diversilobum, Pseudoroegneria spicata, Eriogonum compositum, Balsamorhiza* spp., *Lomatium* spp., and *Lupinus latifolius.* Elev. 300 to 3,600 feet.	Low; limited suitable habitat likely present within Project Survey Area.	Late-March – May

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Lomatium tamanitchii (ribseed biscuitroot)	T	Occurs on hardened, silica-rich volcanic ash layers within water-reworked deposits of volcanic basalt on plateau tops and gentle, often southerly slopes dominated by *Pseudoroegneria spicata, Poa secunda subsp. secunda, P. bulbosa, Ericameria nauseosa,* and *Lagophylla ramosissima.* Soils are shrink-swell clays and shallow over bedrock. Summit populations may be protected by armored surfaces (rock fragments). The species may co-occur with *Lomatium nudicaule, L. klickitatense, L. canbyi,* and *L. triternatum.* Elev. 620-3165 feet (Fertig 2020).	Low to moderate; suitable habitat potentially present within Project Survey Area.	April - June
Meconella oregana (white meconella; white fairy-poppy)	E	Primarily in open grassland; sometimes within mosaic of forest and grassland on gradual to steep slopes. Habitats are wet to moist in spring, but dry by early summer. Associated species include *Pinus ponderosa, Quercus garryana, Poa leibergii, Collinsia parviflora, Lithophragma parviflorum, Olsynium douglasii,* and *Saxifraga integrifolia.* Elev. 60 to 620 feet.	Unlikely; known range does not overlap Project Survey Area.	Late-March – early-April
Mimetanthe pilosa (false monkeyflower)	S	Gravelly or sandy, seasonally moist openings, creek beds, or riverbanks, often on fine gravel or sand. Associated species include *Artemisia ludoviciana, Bromus tectorum, Conyza canadensis, Erythranthe floribunda, Leymus cinereus,* and *Pseudognaphalium stramineum*. Elev. 1,800-2,950 feet.	Unlikely; known occurrence in Klickitat County is historical.	June - September
Montia diffusa (branching montia)	S	Moist forests and open fir woodlands in the lowland and lower montane zones; occasionally in xeric soil or disturbed sites. Associated species include: *Pseudotsuga menziesii, Acer macrophyllum, Acer circinatum, Holodiscus discolor, Symphoricarpos* spp., *Pteridium aquilinum,* and *Claytonia perfoliata.* Elev. 850 to 2,900 feet.	Unlikely; suitable habitat unlikely to occur within Project Survey Area and known occurrences in Klickitat County are historical.	April – July
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 to 2,500 feet.	Low; limited suitable habitat likely present within Project Survey Area.	March – May (June)
Myosurus sessilis (shortstemmed mousetail)	E	Vernal pools and alkali flats. Associated species include: *Myosurus minimus, Navarretia leucocephala, Plagiobothrys* spp., and *Polygonum polygaloides* ssp. *confertiflorum.*	Low; limited suitable habitat likely present within Project Survey Area.	April – May
Navarretia tagetina (marigold navarretia)	S	Open rocky places, scablands, vernal pools, grasslands and stony washes; with standing water or saturated soil in early spring, becoming completely dry in summer. grows in the transition zone between forest and non-forest areas at the east end of the Columbia River Gorge. Associated species include *Pinus ponderosa, Brodiaea coronaria, Deschampsia danthonioides, Olsynium douglasii,* and many annuals.	Low; limited suitable habitat likely present within Project Survey Area.	May - June
Nicotiana attenuata (coyote tobacco)	S	Dry, sandy bottom lands, dry rocky washes, and in other dry open places. Associated species include *Artemisia tridentata, Ericameria* spp., *Bromus tectorum, Leymus cinereus*, *Centaurea diffusa*, *Eriogonum* spp., *Verbascum thapsus*, *Solanum triflorum*, *Achillea millefolium*, *Mentzelia laevicaulis, Salsola tragus* and *Sisymbrium altissimum.* Elev. 320 to 2,640 feet.	Low to moderate; suitable habitat is potentially present in Project Survey Area.	June – September
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. Associated species include *Artemisia tridentata, A. rigida 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 terebinthinus*.	Moderate; suitable habitat is potentially present in Project Survey Area.	Late-April – July

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Oenothera cespitosa ssp. *marginata* (tufted evening-primrose)	S	Dry hills, rocky slopes, and exposed dry washes in open grasslands. Will colonize road cuts and other disturbed sites if there is a seed source. Associated species include *Eriogonum niveum, Ericameria nauseosa, Salvia dorrii, Pseudoroegneria spicata, Balsamorhiza careyana,* and *Aphyllon* (*Orobanche*) *fasciculatum.* Elev. 475 to 1,000 feet.	Low to moderate; suitable habitat is potentially present in Project Survey Area.	May - July
Ophioglossum pusillum (Adder's-tongue)	S	Seasonally wet areas in pastures, old fields roadside ditches, bogs, fens, wet meadows floodplains, moist woods, grassy swales, dry or damp sand, dry hillsides and in seasonally wet, acidic soil. Elev. 40 to 3,200 feet. Associated species include *Pinus contorta, Spiraea douglasii, Carex* spp., *Poa compressa, P. palustris, P. pratensis, Phalaris arundinacea, Agrostis stolonifera, Botrychium* spp., *Fragaria* spp., *Spiranthes* spp., and *Achillea millefolium.*	Unlikely; known occurrences in Klickitat County are historical.	June – September
Orthocarpus bracteosus (rosy owl-clover)	T	Extant sites in Washington are all associated with moist meadows in the transition zone between wetland and upland dominated by grasses and forbs, in full sunlight with little or no shrub or tree cover. Adjacent forested areas are mostly *Pinus ponderosa, Pseudotsuga menziesii, Carex* spp., *Juncus* spp., *Orthocarpus luteus, Castilleja tenuis, Lomatium nudicaule, Phalaris arundinacea, Phleum pretense,* and *Deschampsia cespitosa.* Elev. 1,800 to 3,000 feet.	Low; limited suitable habitat likely present within Project Survey Area.	June – August
Oxalis suksdorfii (western yellow oxalis)	X	Usually in meadows and moist forests; sometimes on dry, open slopes or shrubby areas. One population in Washington occurs on grassy sand dunes. Found in a diversity of habitats, suggesting that this species has ability to adapt to environments with varying amounts of moisture and shade.	Highly Unlikely; the only known occurrence in Klickitat County is historical; species potentially extirpated in the Washington.	April – August
Penstemon barrettiae (Barrett's beardtongue)	T	Grows on rocky substrates of basaltic origin, with little soil development, including crevices in basalt cliffs, ledges of rock outcrops, open talus, and occasionally well-drained roadsides. Soils are well drained and composed of windblown material and organic matter. It occurs mostly at lower elevations but is found up to 3,200 feet.	Unlikely; suitable habitat not likely present within Project Survey Area.	Late-April – early-June
Penstemon deustus var. *variabilis* (hotrock penstemon)	E	Dry foothills and lowlands, on open, dry, thin soils over basalt. Sites in Washington lack a distinctive shrub component. Associated species include *Pseudoroegneria spicata, Festuca idahoensis, Eriogonum compositum, Eriophyllum lanatum, Astragalus* spp., *Madia gracilis, Collomia grandiflora,* and *Columbiadoria hallii*. Elev. 1,800 to 3,200 feet.	Low to moderate; suitable habitat is potentially present in Project Survey Area.	(May) June – July
Penstemon eriantherus var. *whitedii* (Whited's fuzzytongue penstemon)	T	Sparsely vegetated, west-facing slopes of small canyons, ridgetops, and dry rocky places in the foothills of the Cascades and in the Columbia Basin; sometimes with an abundance of caliche fragments. Associated species include *Pinus ponderosa, Purshia tridentata, Ericameria nauseosa, Artemisia tridentata, Salvia dorrii, Pseudoroegneria spicata,* and *Bromus tectorum.*	Low; limited suitable habitat likely present within Project Survey Area.	May – July
Pinus albicaulis (Whitebark pine)	S/PropT	Found primarily at upper tree line in subalpine areas of higher mountains. Often associated with *Picea engelmannii* and *Abies lasiocarpa* in dwarfed, wind-blasted krummholz stands. Rarely forms small forests at lower elevations. Washington populations mostly found from 4,200-7,975 feet.	Highly Unlikely; suitable habitat does not occur within Project Survey Area.	Summer
Plectritis brachystemon (short-spurred plectritis)	S	Coastal bluffs, lowland prairies, and rocky balds surrounded by *Pseudotsuga menziesii* and *Acer macrophyllum* forests. Associated species include *Bromus hordeaceus, Camassia quamash, Festuca roemeri, Lomatium utriculatum, Rosa woodsii,* and *common Symphoricarpos albus*. Elev. 130-1,800 feet.	Highly Unlikely; known occurrences in Klickitat County are historical and suitable habitat unlikely within Project Survey Area.	April - June

Scientific name **(Common Name)**	**Status**[1]	**Habitat Characteristics/ Identifying Features**[2]	**Potential to Occur in Project Survey Area**[3]	**Survey Period**
Polygonum parryi (Parry's knotweed)	S	Vernally moist areas in otherwise dry habitats; open places with sandy, gravelly, or rocky soil. In Washington, this species grows at 2,100 feet in an open oak woodland with a high diversity of other annuals. The substrate is a gravelly, volcanic clay loam over basalt bedrock. Associated species include *Quercus garryana, Holodiscus discolor, Bromus tectorum, Bromus hordeaceus, Koeleria macrantha, Heterocodon rariflorum, Lomatium nudicaule, Calochortus subalpinus, Madia gracilis,* and *Gayophytum diffusum.*	Low; limited suitable habitat likely present within Project Survey Area.	(May) June – July
Potentilla newberryi (Newberry cinquefoil)	X	Historically known from receding shoreline of Columbia River near Bingen, Washington at 70 feet. The species almost always occurs in wetlands where there is some seasonal drying such as dry lakeshores, vernal pools, water holes, and river shorelines.	Highly Unlikely; species believe to be extirpated in Washington.	April – July
Ranunculus hebecarpus (downy buttercup)	S	In Washington, found in seasonally moist gravelly sites, vernal wetlands, shaded streamsides, and steep slopes with rocky outcrops and swales bordering Oregon white oak (*Quercus garryana*) forests. Associated species include *Toxicodendron rydbergii, Camassia quamash,* and *Erythranthe guttata*. Elevation in Washington 180-380 feet	Low; limited suitable habitat likely present within Project Survey Area.	March - May
Ranunculus triternatus (obscure buttercup)	E	Meadow steppe habitat dominated by bunchgrasses and forbs. Mostly found on north-facing upper slopes and crests of basalt ridges overlain by loess deposits of varying depth. Associated species include: *Fritillaria pudica, Eriogonum* spp., *Lupinus lepidus, Balsamorhiza sagittata, Festuca idahoensis,* and *Pseudoroegneria spicata.* Elev. 1,900 to 4,000 feet	Low; known range doesn't overlap the Project Survey Area.	March - April
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.	Highly Unlikely; suitable habitat unlikely to be present within Project Survey Area and the only known occurrence in Klickitat County is historical.	April – October
Sabulina pusilla (annual sandwort)	S	Extant occurrences in Washington are found on dry, sparsely vegetated, compacted orange basalt gravel within sagebrush communities and vernally wet areas (Fertig and Kleinknecht 2020). Associated species include *Poa secunda* subsp. *secunda, Salvia dorrii, Lomatium macrocarpum, Elymus elymoides, Balsamorhiza careyana, Astragalus purshii, Draba verna,* and *Bromus tectorum*. Historical populations have been reported from dry, rocky southeast slopes and hillsides. Elev. 490-800 feet.	Unlikely; the only known Klickitat County occurrences are historical.	April – June
Salix sessilifolia (soft-leaved willow)	S	Wet, lowland habitats including silty or sandy riverbanks, riparian forests, dredge spoils, sandy beaches, and at the upper edge of an intertidal zone. Associated species include *Salix sitchensis, S. lucida* ssp. *lasiandra, S. fluviatilis, Populus balsamifera* ssp. *trichocarpa, Alnus rubra, Acer macrophyllum,* and *Cornus sericea.*	Unlikely; suitable habitat unlikely to occur within Project Survey Area and the only known occurrence in Klickitat County is historical.	May - June
Scribneria bolanderi (Scribner's grass)	S	Dry, sandy to rocky soils, seepages, vernal pools, and sometimes along roadsides, from 1,640 to 9,800 feet rangewide. In Washington, historical sites are dominated by grasses and forbs, and include a low rocky riverbank and small peak at about 2,900 feet.	Low; in Washington, species is Low; limited suitable habitat likely present within Project Survey Area.	April – May
Sisyrinchium sarmentosum (pale-blue eyed grass)	T	Seasonally moist grass/sedge meadows and small openings. Meadows are relatively flat to concave and usually hold moisture during winter and spring. Conifers and shrubs such as *Pinus contorta, Picea engelmannii,* and *Spiraea douglasii* border the meadows and are sometimes invasive. Elev. 365 to 5,700 feet.	Unlikely; suitable habitat unlikely to be present within Project Survey Area.	June - August

Scientific name **(Common Name)**	**Status**[1]	**Habitat Characteristics/ Identifying Features**[2]	**Potential to Occur in Project Survey Area**[3]	**Survey Period**
Spiranthes porrifoliia (western ladies'-tresses)	S	Wet meadows, bogs, streams, and seepage slopes. Associated species include: *Carex* spp., *Mimulus guttatus,* and *Triteleia hyacinthina.* Elev. 10 to 6,800 feet.	Low; limited suitable habitat likely present within Project Survey Area.	May – August
Utricularia intermedia (flat-leaved bladderwort)	S	Shallow ponds, slow-moving streams, and wet sedge or rush meadows. Associated species include: *Schoenoplectus acutus, Utricularia minor, U. macrorhiza, Juncus* spp., and *Carex* spp. Elev. 10 to 4,100 feet.	Unlikely; only known occurrence in Klickitat County is historical.	July – August
Veratrum insolitum (Siskiyou false hellebore)	E	Openings in thickets, moist meadows, stream banks, and mixed evergreen forest edges. Elev. 0 to 4,900 feet. In Washington it grows on an open to semi-open slope at 1,300 feet with *Pseudotsuga menziesii, Acer macrophyllum,* and *Holodiscus discolor.*	Highly Unlikely; suitable habitat unlikely to occur within the Project Survey Area.	June - July
Wyethia angustifolia (California compassplant)	S	Dry or seasonally wet, open ground, grassy slopes, meadows, prairies, and openings in oak and pine-oak forests. Elev. up to 6,900 feet throughout range. In Washington, populations grow in moist or dry native prairie habitats and roadside prairie remnants at about 200 feet. Associated species include: *Arrenatherum elatius, Festuca roemeri, Delphinium muttallii, Senecio jacobaea, Daucus carota, Leucanthemum vulgare,* and *Camassia quamash.*	Highly Unlikely; only known occurrence in Klickitat County is historical and all extant occurrences are on the west side of the Cascades.	May – July
Zeltnera muehlenbergii (Monterey centaury)	S	Seasonally moist areas, including the margins of reservoirs and receding shorelines, often on mossy soil. Associated species include long-bracted sedge *Carex athrostachya, Coreopsis tinctoria, Dichanthelium acuminatum, Muhlenbergia asperifolia, Navarretia intertexta, Salix exigua,* and *Sclerolinon digynum*. Elev. 540-2,300 feet.	Unlikely; known occurrences in Klickitat County are historical.	June – August

[1] Status: WNHP (2021a) 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)
PropT = proposed for listing as federally threatened species.

[2] Sources: Burke Museum of Natural History and Culture 2022; WNHP 2021b; Hitchcock and Cronquist 2018

[3] Historical occurrences are those occurrences known only from observations prior to 1978, but still with some hope of rediscovery (WNHP 2021a).

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Appendix C.

Vascular Plants Observed During 2022 Field Surveys

SCIENTIFIC NAME	COMMON NAME	FAMILY	TYPE	Non-native	Noxious Weed Class WA State / Klickitat County	Synonyms / Notes
Achillea millefolium	milfoil, yarrow	Asteraceae	forb	both		
Achnatherum lemmonii	Lemmon's needlegrass	Poaceae	grass			
Acmispon americanus	American bird's-foot trefoil	Fabaceae	forb			*Lotus unifoliolatus; Lotus purshiana*
Acmispon nevadensis	Nevada bird's-foot trefoil, Nevada deervetch	Fabaceae	forb			*Lotus nevadensis*
Aegilops cylindrica	jointed goatgrass	Poaceae	grass	x	Class C / Class C	
Agoseris grandiflora	large-flowered agoseris	Asteraceae	forb			
Agoseris heterophylla	annual agoseris	Asteraceae	forb			
Agropyron cristatum	crested wheatgrass	Poaceae	grass	x		
Allium acuminatum	tapertip onion	Amaryllidaceae	forb			
Allium nevii	Nevius' garlic	Amaryllidaceae	forb			*Allium douglasii* var. *nevii*
Alopecurus pratensis	field meadow-foxtail	Poaceae	grass	x		
Alopecurus saccatus	Pacific meadow-foxtail	Poaceae	grass			
Amaranthus albus	white pigweed, tumbleweed	Amaranthaceae	forb	x		
Amelanchier alnifolia	saskatoon, serviceberry	Rosaceae	shrub			
Amsinckia sp.	fiddleneck	Boraginaceae	forb			
Antennaria dimorpha	cushion pussytoes, low pussytoes	Asteraceae	forb			
Antennaria luzuloides	silvery-brown pussytoes, woodrush pussytoes	Asteraceae	forb			
Anthriscus caucalis	burr chervil	Apiaceae	forb	x		*Anthriscus scandicina; A. neglecta*
Aphyllon franciscanum	clustered broomrape	Orobanchaceae	forb			*Orobanche fasciculata* var. *franciscana*
Aphyllon purpureum	purple broomrape	Orobanchaceae	forb			*Orobanche uniflora*
Arenaria serpyllifolia	thyme-leaf sandwort	Caryophyllaceae	forb	x		
Arnica fulgens	hillside arnica, orange arnica, shining leopardbane	Asteraceae	forb			
Arrhenatherum elatius	tall oatgrass	Poaceae	forb			
Artemisia ludoviciana	western mugwort, prairie sage, white sagebrush	Asteraceae	forb/subshrub			
Asclepias fascicularis	Mexican whorled milkweed, narrow-leaf milkweed	Apocynaceae	forb			
Asclepias speciosa	showy milkweed	Apocynaceae	forb			
Astragalus purshii	Pursh's milk-vetch, woolly-pod milk-vetch	Fabaceae	forb			
Avena sativa	oat	Poaceae	grass	x		
Balsamorhiza careyana	Carey's balsamroot	Asteraceae	forb			
Balsamorhiza sagittata	arrowleaf balsamroot	Asteraceae	forb			
Barbarea orthoceras	American wintercress rocket, yellow rocket	Brassicaceae	forb			
Bromus diandrus	great brome, ripgut brome, ripgut grass	Poaceae	grass	x		
Bromus hordeaceus	soft chess	Poaceae	grass	x		*Bromus mollis*
Bromus inermis	smooth brome	Poaceae	grass	x		
Bromus secalinus	rye brome	Poaceae	grass	x		
Bromus tectorum	cheatgrass	Poaceae	grass	x		
Buglossoides arvenis	corn gromwell, field gromwell	Boraginaceae	forb	x		*Lithospermum arvense*
Calochortus macrocarpus	sagebrush mariposa lily, green-banded star-tulip	Liliaceae	forb			
Camassia quamash	common camas	Asparagaceae	forb			
Cardamine hirsuta	hairy bittercress	Brassicaceae	forb	x		
Carex athrostachya	slender-beaked sedge	Cyperaceae	sedge			
Carex microptera	small-winged sedge	Cyperaceae	sedge			
Castilleja attenuata	attenuate paintbrush, valley-tassels	Orobanchacaea	forb			*Orthocarpus attenuatus*
Castilleja tenuis	hairy Indian paintbrush	Orobanchacaea	forb			*Orthocarpus hispidus*
Centaurea cyanus	bachelor's button, garden cornflower	Asteraceae	forb	x		
Cerastium glomeratum	sticky mouse-ear chickweed	Caryophyllaceae	forb	x		
Chaenactis douglasii	hoary chaenactis, hoary false-yarrow, Douglas' dustymaiden	Asteraceae	forb			
Chenopodium album	lambsquarters, pigweed	Amaranthaceae	forb	x		
Chondrilla juncea	rush skeletonweed	Asteraceae	forb	x	Class B / Class B	
Cichorium intybus	chicory	Asteraceae	forb	x		

SCIENTIFIC NAME	COMMON NAME	FAMILY	TYPE	Non-native	Noxious Weed Class WA State / Klickitat County	Synonyms / Notes
Cirsium arvense	Canada thistle, creeping thistle	Asteraceae	forb	x	Class C / Class C	
Cirsium vulgare	bull thistle, common thistle	Asteraceae	forb	x	Class C / Not listed	
Clarkia gracilis	slender godetia	Onagraceae	forb			
Clarkia quadrivulnera	four-spot	Onagraceae	forb			*Clarkia purpurea* ssp. *quadrivulnera*
Claytonia rubra	cushion miner's lettuce, red miner's-lettuce	Portulacaceae	forb			
Collinsia parviflora	small blue eyed Mary	Scrophulariaceae	forb			
Collomia grandiflora	large-flowered collomia, large-flower mountain-trumpet	Polemoniaceae	forb			
Convolvulus arvensis	field bindweed	Convolvulaceae	forb	x	Class C / Not listed	
Conyza canadensis	Canadian fleabane, horseweed	Asteraceae	forb			
Crataegus douglasii	black hawthorn, Douglas's hawthorn	Rosaceae	shrub			
Crepis intermedia	gray hawksbeard, intermediate hawksbeard, limestone hawksbeard	Asteraceae	forb			
Crepis occidentalis	western hawksbeard	Asteraceae	forb			
Crepis sp.	hawksbeard	Asteraceae	forb			
Cryptantha flaccida	weakstem cat's-eye, flaccid cryptantha	Boraginaceae	forb			
Cystopteris fragilis	bladder fern, brittle fern, fragile fern	Cystopteridaceae	fern			
Dactylis glomerata	orchard grass	Poaceae	grass	x		
Delphinium distichum	two-spike larkspur	Ranunculaceae	forb			*Delphinium strictum*
Delphinium nuttallianum	thin-petal larkspur, upland larkspur	Ranunculaceae	forb			
Deschampsia danthonioides	annual hair grass	Poaceae	grass			
Descurainia longepedicellata	mountain tansymustard, narrow tansymustard	Brassicaceae	forb			
Descurainia sophia	flixweed	Brassicaceae	forb	x		
Dipsacus fullonum	teasel	Dipsacaceae » Dips	forb	x		
Dodecatheon sp.	shooting star	Page author: David (	forb			
Draba verna	spring whitlow-grass	Dipsacus fullonum	forb	x		
Drymocallis glandulosa	sticky cinquefoil	Rosaceae	forb			*Potentilla glandulosa*
Eleocharis palustris	common spikerush	Cyperaceae	sedge			
Elymus elymoides	bottlebrush, squirreltail	Poaceae	grass			
Elymus repens	quackgrass	Poaceae	grass	x		
Epilobium brachycarpum	autumn willowherb, tall annual willowherb	Onagraceae	forb			
Equisetum sp.	horsetail, scouring-rush	Equisetaceae	forb			
Ericameria nauseosa	rubber rabbitbrush, common rabbitbrush	Asteraceae	shrub			
Eriogonum compositum	arrow-leaf buckwheat	Polygonaceae	forb/subshrub			
Eriogonum elatum	rush buckwheat, tall buckwheat	Polygonaceae	forb/subshrub			
Eriogonum sphaerocephalum var. *sublineare*	scabland wild buckwheat	Polygonaceae	forb/subshrub			
Eriogonum strictum ssp. *proliferum*	Blue Mountain buckwheat, strict buckwheat	Polygonaceae	forb			
Erodium cicutarium	redstem stork's bill	Geraniaceae	forb	x		
Erysimum capitatum	sand dune wallflower	Brassicaceae	forb			*Erysimum asperum*
Erythranthe guttata	seep monkey-flower, yellow monkey-flower	Phrymaceae	forb			*Mimulus guttatus*
Festuca idahoensis	Idaho fescue, bluebunch fescue	Poaceae	grass			
Filago arvensis	field cottonrose, field filago	Asteraceae	forb	x		*Logfia arvensis*
Fritillaria pudica	yellow bells, yellow fritillary, yellow mission bells	Liliaceae	forb			
Galium aparine	common bedstraw, common cleavers, sticky-willy	Rubiaceae	forb			
Geum macrophyllum	bigleaf avens, large-leaved avens	Rosaceae	forb			
Gnaphalium palustre	lowland cudweed, western marsh cudweed	Asteraceae	forb			
Gratiola neglecta	American hedge-hyssop, clammy hedge-hyssop	Plantaginaceae	forb			
Hieracium scouleri	hound-tongue hawkweed, Scouler's hawkweed	Asteraceae	forb			*Hieracium cynoglossoides*
Holosteum umbellatum	jagged chickweed	Caryophyllaceae	forb	x		
Hordeum marinum ssp. *gussoneanum*	Mediterranean barley	Poaceae	grass	x		
Hordeum murinum	mouse barley, smooth barley, wall barley	Poaceae	grass	x		

SCIENTIFIC NAME	COMMON NAME	FAMILY	TYPE	Non-native	Noxious Weed Class WA State / Klickitat County	Synonyms / Notes
Hydrophyllum capitatum	ballhead waterleaf	Hydrophyllaceae	forb			
Idahoa scapigera	flatpod, scalepod	Brassicaceae	forb			
Iris missouriensis	western blue flag, Rocky Mountain iris	Iridaceae	forb			
Juglans sp.	walnut	Juglandaceae	tree	x		
Juncus balticus	Baltic rush	Juncaceae	rush			
Juncus bufonius	toad rush	Juncaceae	rush			
Juncus nevadensis	Nevada rush	Juncaceae	rush			
Juniperus occidentalis	western juniper	Cupressaceae	shrub			
Lactuca serriola	prickly lettuce	Asteraceae	forb	x		
Lagophylla ramosissima	slender hareleaf, common rabbitleaf	Asteraceae	forb			
Lamium amplexicaule	common dead-nettle, giraffehead	Lamiaceae	forb	x		
Lathyrus lanszwertii	Nevada peavine, thick-leaved peavine	Fabaceae	forb			
Lepidium heterophyllum	purple-anther pepperweed, Smith's pepperweed	Brassicaceae	forb	x		
Lepidium perfoliatum	clasping pepperweed	Brassicaceae	forb	x		
Linaria vulgaris	greater butter-and-eggs; yellow toadflax	Plantaginaceae	forb	x	Class C / Not listed	
Lithophragma glabrum	bulbous woodland star	Saxifragaceae	forb			
Lithophragma parviflorum	small-flower woodland star	Saxifragaceae	forb			
Lithospermum ruderale	western gromwell, Columbian puccoon, western stoneseed	Boraginaceae	forb			
Lomatium brevifolium	narrowfruit biscuit-root, short-leaved biscuit-root	Apiaceae	forb			*L. triternatum* var. *brevifolium*
Lomatium macrocarpum	large-fruit desert-parsley, bigseed lomatium	Apiaceae	forb			
Lomatium nudicaule	bare-stem lomatium	Apiaceae	forb			
Lomatium piperi	Piper's biscuit-root,	Apiaceae	forb			
Lomatium simplex	nine-leaf biscuit-root, nine-leaf desert-parsley	Apiaceae	forb			
Lomatium triternatum	triternate biscuit-root	Apiaceae	forb			
Lupinus bicolor	field lupine, small-flowered lupine, two-color lupine	Fabaceae	forb			
Lupinus latifolius var. *latifolius*	broadleaf lupine	Fabaceae	forb			
Lupinus lepidus var. *aridus*	prairie lupine	Fabaceae	forb			*Lupinus aridus* ssp. *aridus*
Lupinus lepidus var. lepidus	Pacific lupine	Fabaceae	forb			
Lupinus leucophyllus var. *leucophyllus*	velvet lupine	Fabaceae	forb			
Lupinus sp.	lupine	Fabaceae	forb			
Madia exigua	threadstem madia, little tarplant, little tarweed	Asteraceae	forb			
Madia gracilis	grassy tarplant, common tarweed, slender tarweed	Asteraceae	forb			
Mahonia repens	creeping Oregon-grape, low Oregon-grape	Berberidaceae	forb			
Malva neglecta	dwarf mallow	Malvaceae	forb	x		
Matricaria discoidea	pineapple weed	Asteraceae	forb	x		
Medicago lupulina	hop clover, black medic	Fabaceae	forb	x		
Medicago sativa	alfalfa, lucerne	Fabaceae	forb	x		
Micranthes nidifica	Columbia saxifrage, swamp saxifrage	Saxifragaceae	forb			
Microsteris gracilis	pink microsteris, slender phlox	Asteraceae	forb			*Phlox gracilis; Gilia gracilis*
Montia linearis	lineleaf Indian lettuce, narrow-leafed montia	Portulacaceae	forb			
Muhlenbergia minutissima	annual muhly, least muhly	Poaceae	grass			
Muhlenbergia spp.	muhlenbergia, muhly	Poaceae	grass			
Myosotis stricta	blue scorpiongrass	Boraginaceae	forb	x		*Myosotis micrantha*
Myosurus alopecuroides	**foxtail mousetail**	**Ranunculaceae**	**forb**			**Threatened in Washington**
Myosurus minimus	tiny mousetail	Ranunculaceae	forb			
Navarretia intertexta	needleleaf navarretia	Polemoniaceae	forb			
Olsynium douglasii	grass-widow, purple-eyed grass-widow	Iridaceae	forb			
Papaver argemone	long prickly-head poppy	Papaveraceae	forb	x		
Phacelia hastata	silverleaf phacelia	Hydrophyllaceae	forb			
Phalaris arundinacea	reed canarygrass	Poaceae	grass	x	Class C / Not listed	

SCIENTIFIC NAME	COMMON NAME	FAMILY	TYPE	Non-native	Noxious Weed Class WA State / Klickitat County	Synonyms / Notes
Phlox hoodii	Hood's phlox, carpet phlox	Polemoniaceae	forb			
Phlox speciosa	showy phlox	Polemoniaceae	forb/subshrub			
Pinus ponderosa	ponderosa pine	Pinaceae	tree			
Plagiobothrys scouleri	Scouler's popcorn flower	Boraginaceae	forb			
Plagiobothrys tenellus	Pacific popcorn-flower, slender popcorn-flower	Boraginaceae	forb			
Plantago lanceolata	English plantain	Plantaginaceae	forb	x		
Plantago major	nippleseed, common plantain, great plantain	Plantaginaceae	forb	x		
Plectritis macrocera	longhorn plectritis	Valerianaceae	forb			
Poa bulbosa	bulbous bluegrass	Poaceae	grass	x		
Poa pratensis	Kentucky bluegrass	Poaceae	grass	x		
Poa secunda ssp. *juncifolia*	alkali bluegrass, big bluegrass, Nevada bluegrass	Poaceae	grass			
Poa secunda ssp. *secunda*	Sandberg bluegrass, curly blue grass	Poaceae	grass			
Poa stenantha var. *stenantha*	narrow-flower bluegrass	Poaceae	grass			
Polemonium micranthum	annual Jacob's-ladder, annual polemonium	Polemoniaceae	forb			
Polygonum aviculare	common knotweed	Polygonaceae	forb	x		
Polygonum polygaloides ssp. confertiflorum	close-flowered knotweed	Polygonaceae	forb			
Polygonum majus	Palouse knotweed, wiry knotweed	Polygonaceae	forb			
Populus alba	white poplar	Salicaceae	tree	x		
Populus nigra	lombardy poplar	Salicaceae	tree	x		
Populus trichocarpa	black cottonwood	Salicaceae	tree			
Potentilla gracilis	slender cinquefoil	Rosaceae	forb			
Potentilla recta	sulphur cinquefoil	Rosaceae	forb	x	Class B / Class B	
Poteridium annuum	annual burnet, prairie burnet	Rosaceae	forb			
Prunus virginiana	chokecherry	Rosaceae	shrub			
Prunus sp.	cherry, plum	Rosaceae	tree	x		
Pseudoroegneria spicata	bluebunch wheatgrass	Poaceae	grass			
Psilocarphus elatior	tall woollyheads	Asteraceae	forb			
Psilocarphus oregonus	Oregon woollyheads	Asteraceae	forb			
Pyrrocoma carthamoides	large-flowered goldenweed	Asteraceae	forb			*Haploppapus carthamoides*
Quercus garryana	Oregon white oak	Fagaceae	tree			
Ranunculus glaberrimus	sagebrush buttercup	Ranunculaceae	forb			
Ranunculus muricatus	spiny-fruit buttercup	Ranunculaceae	forb			
Ribes aureum	golden currant	Grossulariaceae	shrub			
Rorippa curvisiliqua	western yellowcress	Brassicaceae	forb			
Rosa sp.	wild rose	Rosaceae	shrub			
Rubus laciniatus	cut-leaf blackberry, evergreen blackberry	Rosaceae	vine	x	Class C / Not listed	
Rumex crispus	curly dock, sour dock	Polygonaceae	forb	x		
Rumex salicifolius	willow dock	Polygonaceae	forb			*Rumex triangulivalvis*
Salix spp.	willow	Salicaceae	shrub			*Salix lutea*
Sambucus cerulea	blue elderberry	Adoxaceae	shrub			
Scutellaria angustifolia ssp. *angustifolia*	narrow-leaved skullcap	Lamiaceae	forb			
Secale cereale	cereal rye	Poaceae	grass	x	Class C / Not listed	
Sidalcea oregana	Oregon checker-mallow	Malvaceae	forb			
Sisymbrium altissimum	tumble mustard, tall rocket	Brassicaceae	forb	x		
Stellaria media	common chickweed	Caryophyllaceae	forb	x		
Symphoricarpos albus	common snowberry	Caprifoliaceae	shrub			
Symphyotrichum sp.	aster	Asteraceae	forb			
Taeniatherum caput-medusae	medusahead, medusa-head	Poaceae	grass	x	Class C / Not listed	
Taraxacum officinale	common dandelion	Asteraceae	forb	x		
Thinopyrum intermedium	intermediate wheatgrass	Poaceae	grass	x		*Agropyrum intermedium*

SCIENTIFIC NAME	COMMON NAME	FAMILY	TYPE	Non-native	Noxious Weed Class WA State / Klickitat County	Synonyms / Notes
Thinopyrum ponticum	tall wheatgrass	Poaceae	grass	x		
Thysanocarpus curvipes	sand fringepod	Brassicaceae	forb			
Toxicoscordion paniculatum	sand corn, panicled death-camas	Melanthiaceae	forb			*Zigadenus paniculatus*
Toxicoscordion venenosum	meadow deathcamas	Melanthiaceae	forb			*Zigadenus venenosus*
Tragopogon dubius	yellow salsify	Asteraceae	forb	x		
Tragopogon mirus	remarkable goatsbeard	Asteraceae	forb			
Trifolium pratense	red clover	Fabaceae	forb	x		
Trifolium repens	Dutch clover, white clover	Fabaceae	forb	x		
Triteleia hyacinthina	white brodiaea, fool's-onion, wild hyacinth	Asparagaceae	forb			
Triticum aestivum	wheat	Poaceae	grass	x		
Ventenata dubia	Ventenata	Poaceae	grass	x	Class C / Not listed	
Verbascum thapsus	common mullein, flannel mullein, great mullein	Scrophulariaceae	forb	x		
Veronica peregrina var. *xalapensis*	purslane speedwell	Plantaginaceae	forb			
Vicia hirsuta	hairy vetch, tiny vetch	Fabaceae	forb	x		
Vicia villosa	hairy vetch, winter vetch, woolly vetch	Fabaceae	forb	x		
Viola nuttallii	Nuttall's violet	Violaceae	forb			
Viola trinervata	sagebrush violet, desert pansy, 3-nerved violet	Violaceae	forb			
Vulpia myuros	rattail fescue, rattail six-weeks grass	Poaceae	grass	x		
Wyethia amplexicaulis	northern mule's ears, smooth dwarf sunflower	Asteraceae	forb			

Appendix D.

Rare Plant Photographs

Photo 1. Foxtail mousetail beginning to fruit; May 12, 2022.

Photo 2. Foxtail mousetail close-up; May 12, 2022.

Photo 3. Foxtail mousetail with pencil for scale; May 12, 2022.

Photo 4. Overview of vernal pool habitat where foxtail mousetail population was observed; May 12, 2022, facing east.

Photo 5. Overview of vernal pool habitat where foxtail mousetail population was observed; May 12, 2022, facing northwest.

Photo 6. Overview of vernal pool habitat where foxtail mousetail population was observed; May 12, 2022, facing northwest.