GOLDENDALE ENERGY STORAGE HYDROELECTRIC PROJECT

Federal Energy Regulatory Commission Project No. 14861

Klickitat County, Washington

DRAFT LICENSE APPLICATION
Exhibit E: Environmental Report

For:

FFP Project 101, LLC

December 2019

TABLE OF CONTENTS

List of Figures

List of Tables

List of Attachments

Acronyms and Abbreviations

°F	degrees Fahrenheit
AF	acre-foot
AFY	acre-foot per year
AINW	Archaeological Investigations, Inc.
AMSL	above mean sea level
APE	area of potential effect
APLIC	Avian Power Line Interaction Committee
Applicant	FFP Project 101, LLC
bgs	below ground surface
BLM	Bureau of Land Management
BMP	best management practice
BPA	Bonneville Power Administration
CARES	Conservation and Renewable Energy System
CEII	Critical Energy Infrastructure Information
CFR	Code of Federal Regulations
cfs	cubic feet per second
CGA	Columbia Gorge Aluminum
CPSG	Columbia Plateau Steppe and Grassland
CPSS	Columbia Plateau Scabland Shrubland
CRP	Cultural Resources Program
CWA	Clean Water Act
DAHP	Washington State Department of Archaeology and Historic Preservation
DEQ	Oregon Department of Environmental Quality
DLA	Draft License Application
DNR	Washington Department of Natural Resources
DO	dissolved oxygen
EA	Extensive Agriculture
Ecology	Washington State Department of Ecology
EFH	essential fish habitat
ERM	Environmental Resources Management
ESA	Endangered Species Act
ESU	evolutionarily significant unit
EOZ	Energy Overlay Zone
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FLA	Final License Application
GIS	geographic information system
GPS	Geographic Positioning System
HPMP	Historic Properties Management Plan
HUC	Hydraulic Unit Code
IBA	Important Bird Area
IMBCC	Inter-Mountain Basins Cliff and Canyon
IMBBSS	Inter-Mountain Basins Big Sagebrush Steppe
IP	Industrial Park
IPaC	Information, Planning, and Consultation System

IUVAG	Introduced Upland Vegetation—Annual Grassland
IUVAGRO	Introduced Upland Vegetation—Annual Grassland with Rock Outcroppings
JD Pool Project	JD Pool Pumped Storage Hydroelectric Project
KOP	key observation point
KPUD	Public Utility District No. 1 of Klickitat County, Washington
LED	light emitting diode
MDL	minimum detection limit
mg/L	microgram per liter
MPD	Multiple Property Documentation
MTCA	Model Toxics Control Act
MWh	megawatt-hour
NA	not applicable
NEPA	National Environmental Policy Act
NGO	non-governmental organization
NHD	National Hydrography Dataset
NHT	National Historic Trail
NMFS	National Marine Fisheries Service
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRCS	Natural Resources Conservation Services
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
ODFW	Oregon Department of Fish and Wildlife
OHWM	ordinary high water mark
OS	Open Space
PA	Programmatic Agreement
PAD	Pre-Application Document
PCB	polychlorinated biphenyl
PEIS	Preliminary Environmental Impact Statement
PHS	Priority Habitats and Species
PM&E	protection, mitigation, and enhancement
PPA	Preliminary Permit Application
Project	Goldendale Energy Storage Project No. 14861
PVC	polyvinyl chloride
RCRA	Resources Conservation and Recovery Act
RCW	Revised Code of Washington
RPH	rare plant habitat
SHPO	State Historic Preservation Office
SVOC	semi-volatile organic compound
SWMU	Solid Waste Management Unit
TCP	traditional cultural property
TDG	total dissolved gas
TLP	Traditional Licensing Process
TMDL	Total Maximum Daily Loads

UCL	Upper Confidence Limit
U.S.	United States
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	United State Fish and Wildlife Service
USGS	United States Geological Survey
VMMP	Vegetation Management and Monitoring Plan
VRM	Visual Resource Management
VRRMP	Visual and Recreation Resource Management Plan
VOC	volatile organic compound
WAC	Washington Administrative Code
WDFW	Washington Department of Fish & Wildlife
WMP	Wildlife Management Plan
WNHP	Washington Natural Heritage Program
WRIA	Washington Water Resource Inventory Area
WSI	West Surface Impoundment
WSDOT	Washington State Department of Transportation

1.0 GENERAL DESCRIPTION OF THE LOCALE

1.1 Existing Environment

This section provides a report on the existing uses of proposed Goldendale Energy Storage Project No. 14861 (Project) lands and adjacent property, and those land uses that will occur when the Project is constructed. This report was prepared in consultation with local, state, and federal agencies, as described in Section 10.0.

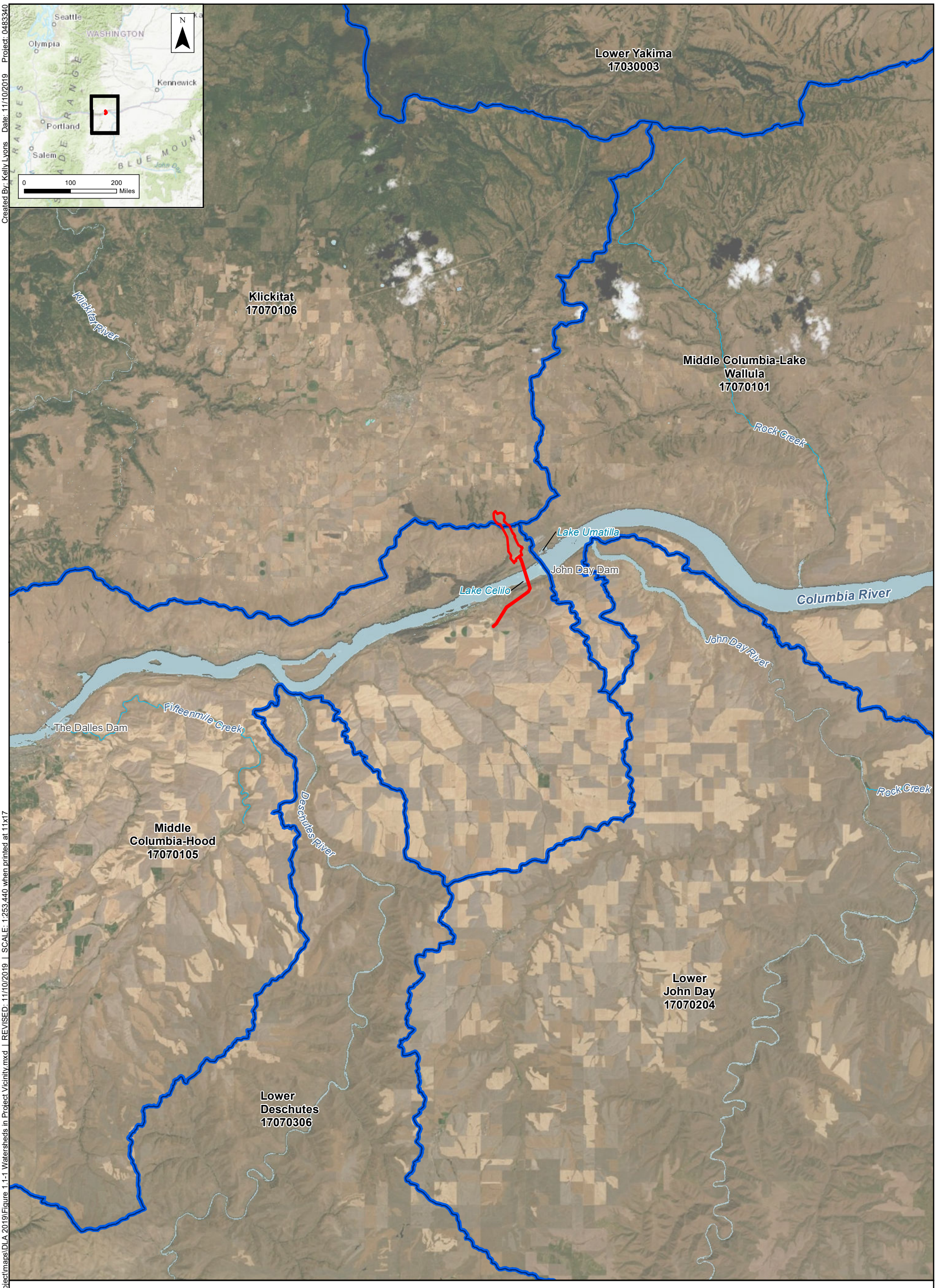
1.2 Major Land Uses

The closest town is Goldendale, Washington, located in Klickitat County, approximately 8 miles northwest of the Project area. Goldendale has an estimated population of 3,485 residents (United States [U.S.] Census Bureau 2018). The next closest town is The Dalles, Oregon, approximately 21 miles southwest and in Wasco County, which had a 2017 population of 15,646 residents (U.S. Census Bureau 2018).

The upper reservoir vicinity includes wind farms and dry-land agriculture/rangeland. A wind farm is located just east of and adjacent to the Project Boundary and consists of 13 wind turbines owned by Tuolumne Wind Project Authority. These wind turbines are part of the Windy Point Phase I Project, which is comprised of 62 wind turbines (Ecology and Environment 2006).

The lower reservoir area was previously occupied by the Columbia Gorge Aluminum (CGA) smelter (currently owned by NSC Smelter). Following construction and operation of hydroelectric dams within the Middle Columbia Basin, construction for the CGA smelter began in 1969 near the present day John Day Dam. The site operated as an aluminum smelter from 1971 to 2003 under various owners, the most current being NSC Smelter. The smelter contributed contaminants to the surrounding soil and water, and in 1990 the site was added to Washington State Department of Ecology's (Ecology) Hazardous Sites List and is currently undergoing contaminant cleanup (Ecology 2019a). The former smelter and its relationship to the proposed Project are discussed in more detail in Section 6.0, Geology and Soils. The lower reservoir vicinity includes the remainder of the CGA smelter lands, Washington State Highway 14, and the Columbia River.

Land cover in the region includes cropland, pastureland, orchards and vineyards, rangeland, and forest land. The majority of the irrigated orchards and pastures in the region are located downstream of the John Day River in the Hood River Valley and The Dalles. Major agricultural commodities include wheat, barley, cattle, hay, pears, apples, and cherries. The Natural Resources Conservation Services (NRCS) estimated that approximately 5 percent of the Middle Columbia-Hood River Watershed is used for irrigated agriculture (a total of 37,600 acres of irrigated lands in 1997 [NRCS 2005]). Watersheds in the Project vicinity are shown on Figure 1.2-1.



Legend

- Water Body
- Drainage Basin
- Proposed Project Boundary

N

0 4 8 Miles

Figure 1.2-1
Watersheds in the Project Vicinity
Draft License Application
Goldendale Energy Storage Project
Goldendale, WA

Environmental Resources Management
www.erm.com

Source: Esri - World Imagery; NAD 1983 StatePlane Washington South FIPS 4602 Feet

Created By: Kelly Lyons Date: 11/10/2019 Project: 0483340

FILE: M:\Projects\Goldendale Energy Storage Project\maps\DLA 2019\Figure 1.1-1 Watersheds in Project Vicinity.mxd | REVISED: 11/10/2019 | SCALE: 1:253,440 when printed at 11x17

1.2.1 Major Water Uses

From its headwaters in British Columbia to the Columbia River Delta, the Columbia River flows for 1,243 miles through a total of 14 dams, providing hydroelectricity and irrigation along its path (Lang 2008). The closest dams to the Project area are the U.S. Army Corps of Engineers (USACE's) John Day Dam just upstream and The Dalles Dam 25 miles downstream.

Groundwater and surface water rights are summarized in Section 2.0, Water Use and Quality; general uses are summarized in this section. The major water uses in the Project area watersheds are agriculture and power generation. In addition, instream flow for fish and aquatic species is also a major water use in the Middle Columbia-Hood watershed. The average demand for agricultural irrigation within the Columbia River Basin is 6.3 million acre-foot per year (AFY), and Ecology estimates that demand would grow 2 percent by 2030 (Ecology 2011b).

Use of groundwater resources in the Project area and vicinity is limited. Three groundwater extraction wells are present within the Project area: two industrial wells associated with the former aluminum smelter, and one domestic or irrigation well reported near the top of the ridge in the northern portion of the area (Ecology 2019a). The community of Goldendale does not use a municipal groundwater source; instead, they rely on spring water originating from the permeable Simcoe Volcanics within the Simcoe Mountains for potable use (Klickitat County Planning 2004).

1.3 Climate

The climate is semi-arid with cool wet winters and hot dry summers (Ecology and Environment 2006). The Project area receives an average of 17 inches of precipitation annually (U.S. Climate Data 2018), primarily as rain. The temperature regime is temperate, with an average summer high of 82 degrees Fahrenheit (°F) (June through September) and an average winter low of 39 °F December through February (U.S. Climate Data 2018).

2.0 WATER USE AND QUALITY

This section provides a summary of existing information on surface hydrology, water quality, and water quantity and usage that may be affected by the proposed Project and associated facilities. Because the proposed Project is relying solely on a purchase of surface water from a water right owned by Public Utility District No. 1 of Klickitat County, Washington (KPUD), as its water source, the discussions below focus on surface water sources, as opposed to groundwater sources, for existing environment and potential impacts.

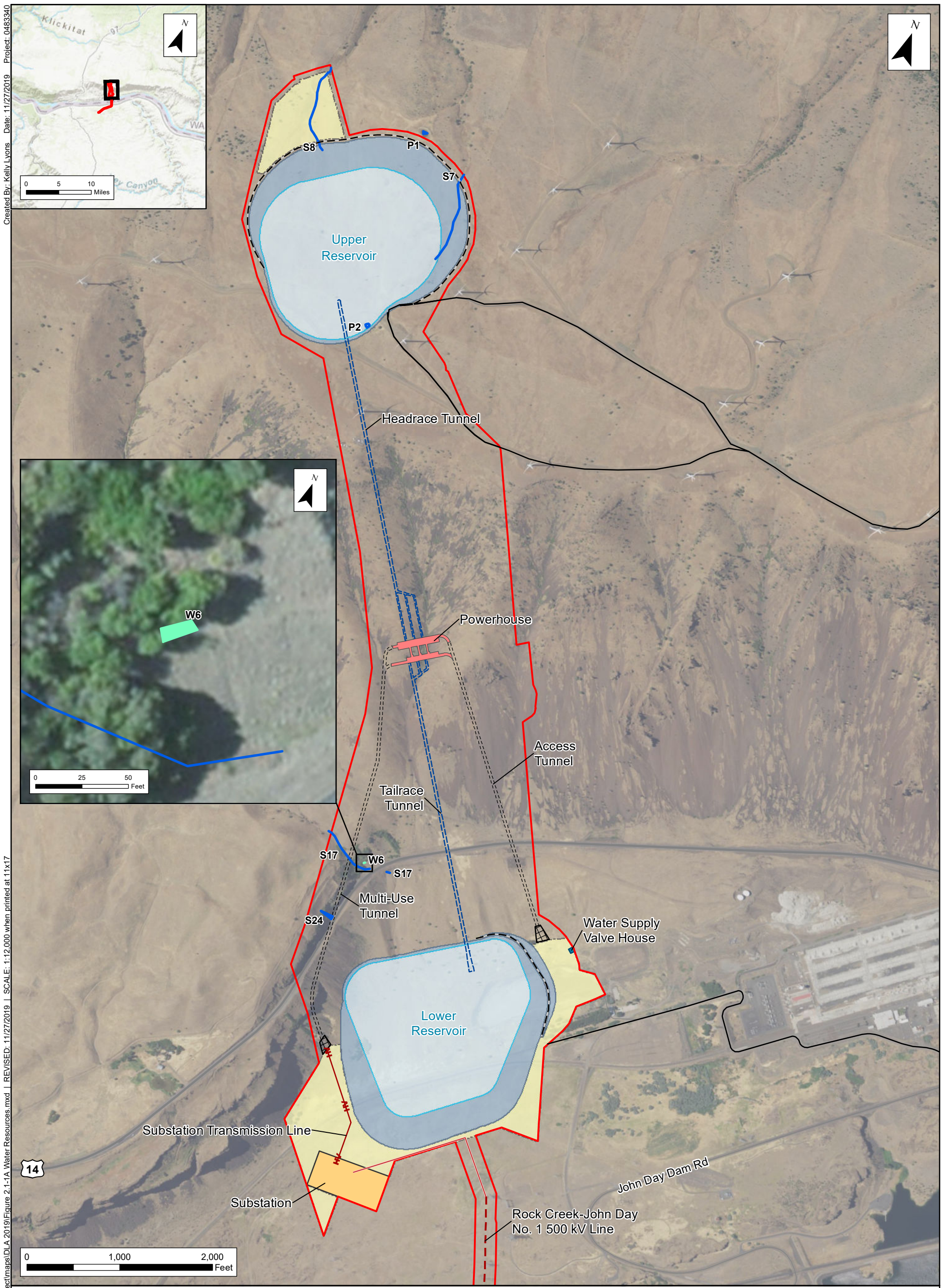
2.1 Existing Environment

2.1.1 Surface Waterbodies

The proposed Project is located in the mid-Columbia River Basin (Hydrologic Unit Code [HUC] 1707) (see Figure 1.2-1 in Section 1.0 above). Project features will be located within the following subbasins:

- The upper reservoir and upper temporary staging area are located in the Upper Swale Creek subbasin (HUC 170701060403).
- The lower reservoir and associated power production infrastructure, as well as about 4 miles of the transmission right-of-way traverses Hells Gate Canyon-Columbia River subbasin (HUC 170701050103), which spans both sides of the Columbia River.

The Columbia River is the nearest surface water feature to the Project's reservoirs and power production infrastructure. It is located approximately 0.7 mile south of the Project's lower reservoir (Figure 2.1-1B). The U.S. Geological Survey (USGS) National Hydrography Dataset (NHD; USGS 2019) identifies nine water features within the proposed Project Boundary. These features were also identified in the U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) database (USFWS 2019a). All of the NHD and NWI mapped surface water features within the Washington State portion of the proposed Project Boundary were assessed during the May 2019 wetland and waters delineation completed by ERM (included as Appendix B) to determine if their characteristics and locations matched the datasets. Features located along the proposed transmission line right-of-way within Project Boundary will not be impacted by the proposed Project and therefore were assessed using desktop methods and were not field verified during the May 2019 field effort. All surface waterbodies and wetlands identified within the Project Boundary are presented in Figures 2.1-1A and 2.1-1B.



Legend

Waterbody Status
- Field Verified Waterbody
- Wetland
- Project Boundary

Proposed Infrastructure
- Access Road
- High Voltage Cable
- Transmission Line
- Transmission Co-Located with Existing BPA ROW
- Existing Access Road
- Reservoir
- Reservoir Berm Outer Slope
- Laydown Area
- Powerhouse
- Substation
- Water Supply Valve House
- Access Tunnel
- Access Tunnel Portal
- Headrace/Tailrace Tunnel

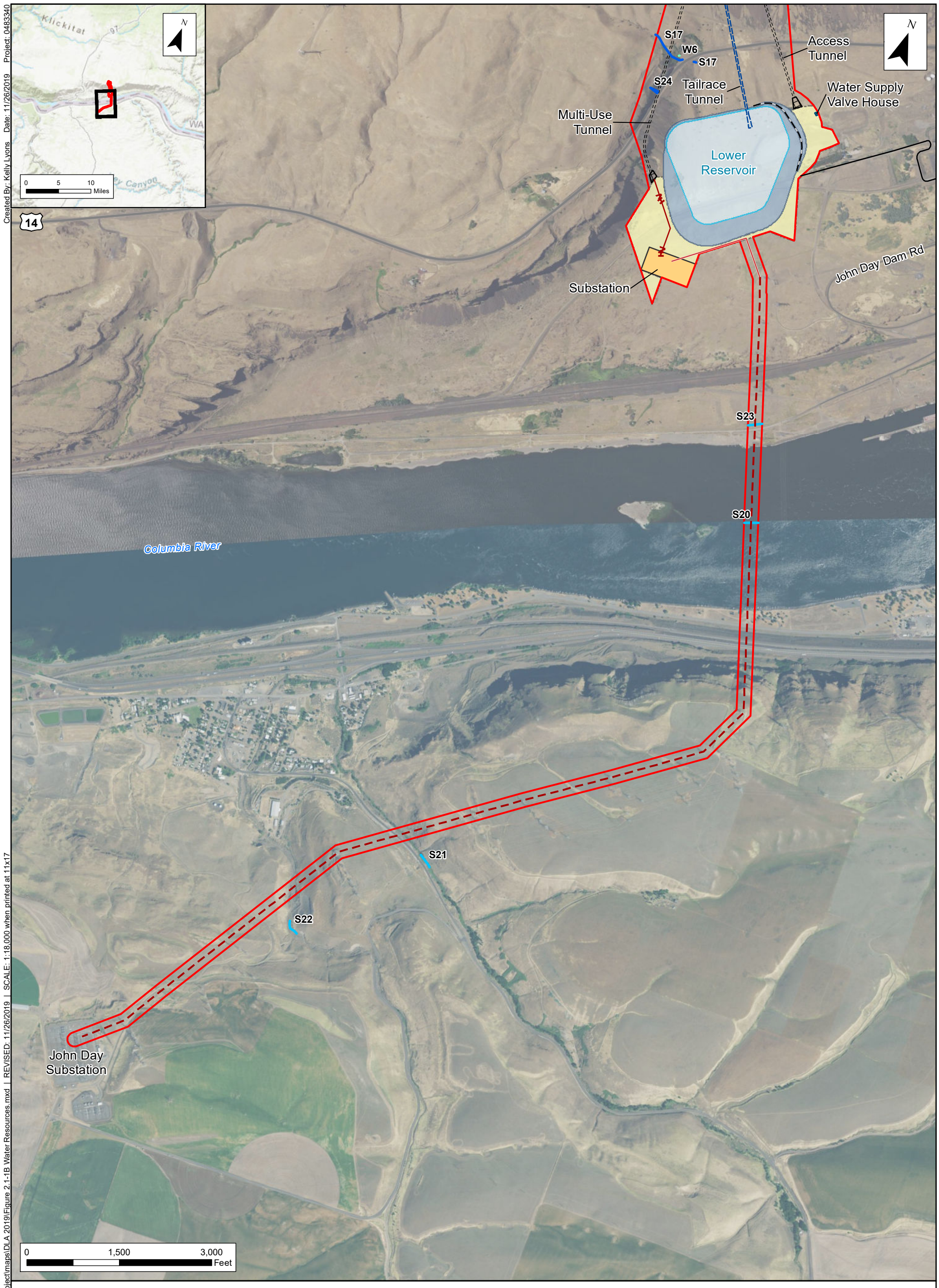
Figure 2.1-1A
Water Resources in Project Vicinity
Draft License Application
Goldendale Energy Storage Project
Goldendale, WA

Environmental Resources Management
www.erm.com

Source: National Agricultural Imagery Program, July 2017, flown 1m per pixel; NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

Created By: Kelly Lyons Date: 11/27/2019 Project: 0483340

FILE: M:\Projects\Goldendale Energy Storage Project\maps\DLA 2019\Figure 2.1-1A Water Resources.mxd | REVISED: 11/27/2019 | SCALE: 1:12,000 when printed at 11x17



Created By: Kelly Lyons Date: 11/26/2019 Project: 0483340

FILE: M:\Projects\Goldendale Energy Storage Project\maps\DLA 2019\Figure 2.1-1B Water Resources.mxd | REVISED: 11/26/2019 | SCALE: 1:18,000 when printed at 11x17

Legend

Waterbody Status
- Field Verified Watercourse
- Desktop Verified Watercourse
- Wetland
- Project Boundary

Proposed Infrastructure
- Access Road
- High Voltage Cable
- Transmission Line
- Transmission Co-Located with Existing BPA ROW
- Reservoir
- Reservoir Berm Outer Slope
- Laydown Area
- Substation
- Water Supply Valve House
- Access Tunnel
- Access Tunnel Portal
- Headrace/Tailrace Tunnel

Figure 2.1-1B
Water Resources in Project Vicinity
Draft License Application
Goldendale Energy Storage Project
Goldendale, WA

Environmental Resources Management
www.erm.com

Source: National Agricultural Imagery Program, July 2017, flown 1m per pixel; NAD 1983 StatePlane Washington South FIPS 4602 Feet

Features that were verified during the May 2019 field effort are described in the text below, while those that were desktop reviewed are summarized in Table 2.1-1 below.

- S7- Feature S7 is identified as a perennial watercourse in both the NHD and NWI datasets that is located near the upper reservoir. However, based on observations during the May 2019 wetland and waters delineation, this feature is an ephemeral stream channel that is 16 to 24 inches wide, 1 to 3 inches deep, and extends approximately 995 feet into the Project Boundary. Evidence of an ordinary high water mark (OHWM) included an incised bed and bank, sediment sorting, and debris wracking. Substrate consists of small cobbles, gravels, and fines. Although no flowing water was observed, much of the substrate was covered with algal matting. Vegetation along S7 consists of bulbous bluegrass (*Poa bulbosa*), cheatgrass (*Bromus tectorum*), smallflower woodland-star (*Lithophragma parviflorum*), barestem biscuitroot (*Lomatium nudicaule*), and Hood River milk-vetch (*Astragalus hoodianus*).

- S8- Feature S8 is identified as a perennial watercourse in both the NHD and NWI datasets that is located near the upper reservoir. However, based on observations during the May 2019 wetland and waters delineation, this feature is an ephemeral stream channel that is 12 to 24 inches wide, 1 to 3 inches deep, and extends approximately 990 feet into the Project Boundary. Evidence of an OHWM included an incised bed and bank, sediment sorting, and debris wracking. Substrate consists of small cobbles, gravels, and fines. Although no flowing water was observed, several pockets of standing water were observed, and much of the substrate was covered with algal matting. Vegetation along S8 is similar to the species described along S7.

- P1- Feature P1 is identified as a perennial pond in the in both the NHD and NWI datasets that is located near the upper reservoir, just outside the Project Boundary. The pond appears to be artificially created to support cattle grazing on the surrounding property. At the time of the May 2019 delineation, the pond appeared to be nearly full. Unidentified emergent vegetation was observed growing 1 to 2 feet of standing water. Review of Google Earth aerial imagery suggests that the pond partially dries up but retains a small amount of water throughout the year. The pond is approximately 0.2 acre in size.

- P2- Feature P2 is identified as a perennial pond in the in the NHD; however, it is not included in the NWI dataset. The pond is located near the upper reservoir and appears to be artificially created to support cattle grazing on the surrounding property. At the time of the May 2019 delineation, the pond appeared to be about half full. The edges of the pond are largely unvegetated, and no emergent vegetation was observed growing within the water. Review of Google Earth aerial imagery suggests that the pond dries up entirely most years. The pond is approximately 0.03 acre in size.

- S17- Feature S17 is identified as an intermittent watercourse in both the NHD and NWI datasets that crosses Highway 14 near the lower reservoir. Additionally, the NWI identifies a palustrine shrub-scrub wetland immediately upslope of the highway. Field observations during the May 2019 delineation confirmed this feature is an intermittent stream channel; however, there is no shrub-scrub wetland present. The stream channel about 24 inches wide, 1 to 3 inches deep, with substrate consisting of mud and fine gravels. Evidence of an OHWM included a defined bed and bank and sediment sorting. The channel begins above the

highway and is conveyed beneath the highway through a metal culvert. Flowing water 1 to 3 inches deep was observed above the highway; however, no water was observed exiting the culvert at the outlet on the southeast side of the highway. Below the culvert outlet, the stream channel resembled a grassy swale that lacked the OHWM indicators observed above the highway, suggesting the culvert may be damaged and the stream flow goes subsurface beneath the highway. Vegetation along S17 consists of netleaf hackberry (*Celtis reticulata*), Himalayan blackberry (*Rubus armeniacus*), seep monkeyflower (*Mimulus guttatus*), bedstraw (*Galium sp.*), bulbous bluegrass, and cheatgrass.

- S24- Feature S24 is not identified in either the NHD or NWI datasets, but appears to be a groundwater seep located along the excavated hillside above Highway 14 near the lower reservoir. Water flowed down the hillside into a roadside drainage ditch and into a culvert that conveyed the water to east side of the highway. Similar to S17, no flowing water was observed existing the culvert outlet. Vegetation within the seep consists primarily of Himalayan blackberry.

Table 2.1-1 below summarizes the surface waters located along the proposed transmission line right-of-way within the Project Boundary, which will not be impacted by the proposed Project. Although the Project Boundary crosses over the Columbia River, that portion of the Project Boundary represents the existing aerial transmission line; the Columbia River will not be impacted.

Table 2.1-1: Desktop Assessed Surface Water Features in the Proposed Project Boundary Spanned Aerially by the Proposed Project

Feature ID	Feature Name	NHD Classification	NWI Classification
S20	Columbia River	Perennial Lake/Pond	Lacustrine Limnetic, Unconsolidated bottom, Permanently flooded, Diked/ Impounded (L1UBHh)
S21	Scott Canyon	Intermittent water course	Riverine, Intermittent, Streambed, Seasonally flooded (R4SBC)
S22	Gerking Canyon	Intermittent water course	Riverine, Intermittent, Streambed, Seasonally flooded (R4SBC)
S23	Unnamed canal/ditch	Intermittent water course	Riverine, Intermittent, Streambed, Seasonally flooded (R4SBC)

Sources: USGS 2019; USFWS 2019a

NHD = National Hydrography Dataset; NWI = National Wetlands Inventory

2.1.2 Water Quantity

This section describes the surface water quantities (flow and water rights) within and adjacent to the Project Boundary. The Columbia River flows underneath the Project's transmission line and is highly regulated for power generation and instream flow protection. Applications for surface water withdrawals from the mainstem Columbia River are subject to the Instream Resource Protection Program (Chapter 173-562 Washington Administrative Code [WAC]) for the Columbia River.

Table 2.1-2 summarizes the average monthly flows in the Columbia River at the nearest USGS gage at The Dalles, Oregon (ID #14105700), approximately 25 miles downstream, based on 140 years of record (1878 to 2018). The median average monthly flow was 144,950 cubic feet per second (cfs), which equates to 81,084,418 AFY. Discharges for the period of record ranged from a minimum average monthly flow of 42,430 cfs in 1937 to a maximum average monthly flow of 1,002,000 cfs in 1894. The flow duration curve for this data is presented in Figure 2.1-2, with the 80 percent, 50 percent, and 20 percent exceedance flows identified as 100,215 cfs, 144,740 cfs and 262,770 cfs, respectively.

Table 2.1-2: Columbia River Flow at The Dalles[a]

Water Metric	Columbia River			
	Minimum[b]	Maximum[c]	Mean	Median
Flow at The Dalles (cfs)	42,430	1,002,000	189,376	144,950
Flow as AFY	37,646,337	246,149,127	85,428,226	81,084,418

Sources: USGS 2019

AFY = acre-foot per year; cfs = cubic feet per second

[a] Based on 140 years of record 1878-2018

[b] 1937

[c] 1894

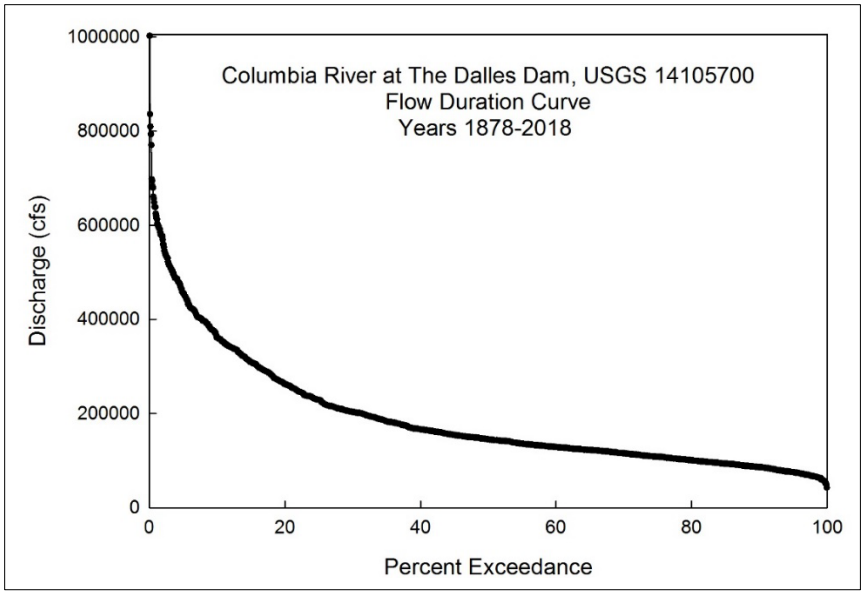


Figure 2.1-2: Flow Duration Curve for Columbia River at The Dalles USGS Gage

2.1.2.1 Water Rights and Usage

Water rights information in the vicinity of the Project area was reviewed using Ecology's Water Resources Program Water Resources Explorer (Ecology 2019d) and the Oregon Water Resources Department's Water Right Mapping Tool (Oregon Water Resources Department

2014). Water rights in the Project vicinity are largely groundwater withdrawals for irrigation use. The next largest grouping is groundwater rights for stock watering and domestic use.

Table 2.1-3 presents the larger surface water rights of the Columbia River in the vicinity of the proposed Project Boundary. The largest surface water right is owned by KPUD, and formerly provided industrial supply the historic CGA smelter. KPUD owns a 15,591 AFY water right from the former CGA smelter (No. S3-00845C, No. G4-01130C). This water right was gifted to KPUD by a quitclaim deed executed on December 22, 2005. After legal transfer of ownership, this water right was amended for municipal purposes. As mandated by Ecology, the water right must be put to beneficial use by 2028. Subsequently, by Washington State law passed unanimously and signed by Governor Christine Gregoire on March 30, 2012, KPUD is expressly authorized to use this water right for a pumped storage generating facility and to sell water for pumped storage projects. The Project will use water purchased from KPUD for the initial filling of the lower reservoir and a small amount of makeup water as needed using an existing pumping station largely in a closed-loop system.

Table 2.1-3: Significant Surface Water Rights of the Columbia River near the Proposed Project Area

Agency Record No.	Applicant, Permittee, Certificate Holder, or Claimant	Max Instantaneous Water Diversion Requested or Allocated (cfs)	Annual Volume of Water Requested or Allocated (AFY)	Purpose
CS3-00845C@2	KPUD	35	15,479	Commercial & Industrial
S4-01230CWRIS	Harris Farms Inc.	7	1360	Irrigation
S4-27781GWRIS	Harris Farms Inc.	6	1208	Irrigation
S4-28881(B)	U.S. Army Corps of Engineers	0.44	24	Irrigation

Source: Ecology 2019d

AFY = acre-foot per year; cfs = cubic feet per second

2.1.3 Water Quality

The Clean Water Act (CWA) requires states to adopt water quality standards designating beneficial uses of the state's waters and setting criteria designed to protect those uses. As such, Ecology and the Oregon Department of Environmental Quality (DEQ) have established water quality standards for surface waters in each respective state, which are the regulatory tools to limit pollution of the states' waters.

Water quality information is not available for the one intermittent (S17) and two ephemeral streams (S7 and S8) within the Project Boundary, as these waters are not gaged.

The Columbia River, which flows under the Project's proposed Bonneville Power Administration (BPA) transmission route, forms the border of Washington and Oregon and is included on the impaired waterbodies lists for both states. The Washington 303(d) List was used instead of the Oregon List because the Oregon List includes larger (longer) assessment units and

therefore includes additional impairments that have not been found in the Project vicinity. For Washington, there are two assessment units in the Project vicinity. The portion of the river at the transmission route crossing is part of the Lake Celilo assessment unit, which extends upstream to the John Day Dam (Ecology 2019b). The Washington Lake Umatilla assessment unit starts at the John Day Dam and extends upstream. In Washington, Ecology has identified the following designated uses for the Lake Umatilla assessment unit: fish and aquatic life uses (spawning/rearing); recreation use; domestic, industrial, agricultural, and stock water supply uses; wildlife habitat; harvesting; commercial/navigation; boating; and miscellaneous aesthetics uses (Ecology 2011a). In Oregon, DEQ has identified similar designated uses for this portion of the Columbia River, including fish and aquatic life (salmon and steelhead migration corridors); wildlife and hunting; and fishing water uses; public and private domestic, industrial, irrigation, and livestock water supply uses; and boating, water contact recreation, aesthetic quality, hydropower, and commercial navigation and miscellaneous transportation uses (DEQ 2012; Ecology 2012).

Washington lists the Columbia River within their Lake Umatilla assessment unit on the latest (2012) 303(d) List of Impaired Waterbodies as impaired for water temperature, and pesticides and polychlorinated biphenyl (PCBs) in tissue (Table 2.1-4; Ecology 2019c). The Lake Celilo assessment unit is listed exclusively for temperature. This 2012 list for Washington waters was approved by U.S. Environmental Protection Agency (USEPA) in 2016. The Lake Umatilla and Lake Celilo assessment units are also included in two Columbia River Total Maximum Daily Load (TMDL) plans: for total dissolved gas (TDG) in water (Ecology and DEQ 2002) and dioxins in tissue (USEPA 1991). TDG and dioxin are not listed as impairments on the 2012 303(d) List.

Table 2.1-4: Washington 2012 303(d) Listed Impairments for the Lake Umatilla and Lake Celilo Assessment Units on the Columbia River

Waterbody	Medium	2012 303d List	TMDL Plan
Columbia River- Lake Umatilla	Water	Temperature	NA
	Water	NA	TDG
	Tissue	Pesticides	NA
	Tissue	PCBs	NA
	Tissue	NA	Dioxin
Columbia River- Lake Celilo	Water	Temperature	NA
	Water	NA	TDG
	Tissue	NA	Dioxin

Source: DEQ 2012

NA= not applicable
PCB = polychlorinated biphenyl; TDG = total dissolved gas; TMDL = Total Maximum Daily Load

Water quality in KPUD's intake pool was assessed in May 2015. At two locations in the pool, vertical profiles of temperature, pH, conductivity, and dissolved oxygen (DO) were measured at

depth intervals of 2 feet below the surface using a YSI600 multi-parameter water quality meter. Water samples were also collected at two locations and analyzed for the following parameters: pesticides, PCBs, priority pollutant metals, volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs). Pesticides, PCBs, VOCs, and SVOCs were not detected at or above the minimum detection limit (MDL) for both locations. Arsenic, antimony, chromium, copper, and lead were detected above the MDL but below the reporting limit.

2.1.4 Groundwater

In the lower elevation portions of the proposed Project area (where the lower reservoir is proposed), groundwater has been encountered during geotechnical investigation drilling at depths ranging from 2 to 25 feet below ground surface (bgs), which is about 156 to 181 feet above the normal Lake Umatilla portion of the Columbia River pool elevation of approximately 265 feet above mean sea level (AMSL). The water is present in unconsolidated sediments overlying basaltic rocks that likely act as an aquitard that limits downward infiltration of groundwater. Because the groundwater level is significantly higher than the Lake Umatilla elevation, and because an aquitard is present at the base of the aquifer, the groundwater in the general vicinity of the proposed lower reservoir is considered perched groundwater. Season fluctuations of groundwater levels up to 2 feet have been observed in the wells in the general site vicinity (Shannon & Wilson 2002).

Several boring and well logs were identified in the area near the top of the steep slope in the northern portion of the Project area (where the upper reservoir is proposed); however, all but one of those logs were for shallow borings of less than 20 feet bgs that did not encounter groundwater (Ecology 2014a). One well log in this area was reportedly drilled to a depth of 112 feet bgs, and encountered groundwater at 80 feet bgs in fractured bedrock; however, its proximity to the Project is unknown because of the scale provided in the well log location record.

Two springs just north of the top of the ridgeline and west of the proposed Project at elevations of approximately 2,750 and 2,790 feet AMSL are shown on the USGS base map used to develop the geologic map of the area in Phillips and Walsh (1987). Seven springs are also mapped south of the ridgeline in this area at elevations ranging between 1,080 and 2,500 feet AMSL. The top of the ridge in this area ranges from approximately 2,850 to 2,920 feet AMSL. These springs appear to be primarily associated with contacts between lava flow units and fault zones, both of which are common preferential pathways for groundwater flow. No springs or other surface expressions of groundwater presence are reported within the vicinity of the proposed Project.

2.1.5 Wetlands

The NWI identifies two palustrine (freshwater) shrub-scrub wetlands within the proposed Project Boundary (USFWS 2019a). During the May 2019 wetland and water delineation, ERM biologists determined that neither of these features exist on the landscape. However, ERM

biologists did identify a palustrine emergent wetland (W6) on an abandoned roadbed upslope of feature S17 described in Section 2.1.1 (see Figure 2.1-1A above and Appendix B of this Draft License Application [DLA]). This small wetland is approximately 123 square feet (0.003 acre) and originates from a groundwater seep located on a cut bank above an abandoned roadbed. Water from the seep flows down the roadbed for about 20 feet before infiltrating into the soil, no surface connection to S17 was observed. Vegetation within the wetland consists almost entirely of seep monkeyflower and Himalayan blackberry.

2.2 Potential Resource Impacts

This section describes the potential impacts to surface water resources, including water quantity and quality. The Applicant's objectives are to avoid or minimize all impacts from Project construction and operations to surface water within and near the proposed Project area. Potential impacts are expected to be minimal since the Project will operate as an off-channel, closed-loop system.

2.2.1 Surface Waterbodies

Construction of the proposed Project will directly impact features S7, S8, and P2; however, all other waterbodies will be completely avoided and will not be impacted by Project construction or operation.

Construction of the upper reservoir will permanently impact approximately 890 linear feet of stream S7, 75 linear feet of stream S8, and the entirety of pond P2 (0.03 acre). An additional 800 linear feet of stream S8 will be temporarily impacted through construction of the temporary construction laydown area. The permanent impacts to streams S7 and S8 are relatively minor as they represent about 6 percent and 3 percent, respectively, of each stream's overall length, and temporary impacts to stream S8 from the construction laydown area represents about 27 percent of the stream's overall length. As described above, streams S7 and S8 are ephemeral stream channels. An ephemeral stream is located above the water table and only flows in response to precipitation events (USEPA 2019). Pond P2 is ephemeral as well since it fills in response to precipitation events and completely dries up most years. Construction of the upper reservoir will therefore result in the reservoir capturing and retaining a limited amount of rainfall that would otherwise reach these stream channels and pond. However, at about 90 acres the upper reservoir will occupy about 0.5 percent of the Lower Swale Creek watershed (HUC 170701060403), which about 18,700 acres (USGS 2019). Therefore, the overall impact to runoff and stream flow within the watershed will be minimal.

2.2.2 Water Quantity

Project waters will be purchased from KPUD. KPUD holds a certificated water right for 15,479 AFY at a maximum of 34.63 cfs for industrial use (Ecology 2019d). The Project is expected to require 9,000 AF of water for the initial fill and an additional 390 AFY to offset

evaporative losses (Table 2.2-1). The withdrawal of surface water from KPUD's Intake Pool, which is a surface water source hydrologically connected to the Columbia River, for the initial filling of the reservoir will decrease median discharge in the Columbia River at The Dalles by 0.01 percent (Table 2.2-2), and reduction from the estimated annual net reservoir losses will be 0.0005 percent. These amounts are less than those previously used at this withdrawal location when the CGA smelter was active. As no additional appropriations will be required, this use will protect existing surface water resources and be consistent with other water rights for the Columbia River. The initial fill will be completed gradually over approximately 6 to 12 months, depending on the construction schedule. Additionally, reservoir recharge resulting from evaporation losses will be conducted during periods when excess water is available, so as to conform to existing water rights.

Precipitation on the reservoir water surfaces will represent the only natural reservoir recharge. The reservoirs will be lined so that the reservoirs will not leak, therefore any losses are associated with evaporation. Since the reservoirs are enclosed on all sides by an embankment, surface water runoff will not enter or be intercepted by the reservoirs.

Table 2.2-1: Estimated Water Needs for the Proposed Goldendale Energy Storage Project

Water Metric	Upper Reservoir	Lower Reservoir
Volume at Mean Sea Level (AF)	7,100	7,100
Surface Area at Max Pool (acres)	59	62
Estimated Evaporation (AFY)[a]	190	200
Estimated Precipitation (AFY)[a]	70	80
Placeholder for Losses (AFY)[b]	50	50
Estimated Net Loss / Estimated Refill (AFY)	170	170
Initial Fill Volume, total Project (AF)	9,000	

AF = acre-foot; AFY = acre-foot per year

[a] Based on recorded Hydromet/AgriMet Data from gage in Goldendale, Washington, operated by U.S. Bureau of Reclamation

[b] Assumed placeholder value. To be confirmed with additional engineering studies.

Table 2.2-2: Project Water Volume Relative to Columbia River Surface Water at The Dalles

Water Metric	Volume (AFY)	% of Columbia River[a]
KPUD Water Right	15,479	0.019
Project Water Storage/Initial Fill Volume	9,000	0.01
Estimated Project Net Loss, Annual	390	0.0005
Columbia River Flow Median[1]	81,084,418	NA

AFY = acre-foot per year; NA = not applicable

[a] Based on 140 years of record measured USGS gage at The Dalles (USGS 2019)

2.2.3 Water Quality

The Project is not expected to cause any impacts to water quality within or adjacent to the Project area, including to intermittent streams or the Columbia River. Any potential impacts to surface waters due to ground disturbance during construction would be managed through the Project's Erosion and Sediment control plan.

Residence in the proposed Project reservoirs for extended periods of time may concentrate any solutes present in source waters. However, any concentrated solutes would not impact surface waters as the Project will not discharge to any surface waters.

2.2.4 Groundwater

It is not anticipated that groundwater will be impacted by construction given normal construction techniques and materials.

The upper and lower reservoirs will be constructed with double liner systems to prevent leakage into groundwater. This liner system will be designed to prevent reservoir water from impacting groundwater and will also prevent groundwater from coming into the reservoir. Preventing water leakage from the reservoir will diminish impacts on groundwater flow from adjacent landfills. However, the design of the reservoir (depth, location, and type of the foundations, pipe runs, and other subsurface facilities) could impact groundwater flow causing it to move around those impediments. Overall flow direction is anticipated to remain to the southwest.

The apparent source of groundwater impacts (the solid waste within the West Surface Impoundment [WSI], described in more detail in Section 6.2) will be removed when the lower reservoir is constructed. This will likely significantly decrease the concentration of sulfate and fluoride in groundwater in the lower reservoir vicinity. Additionally, it is expected that once the WSI source material is removed, the concentration of these relatively soluble groundwater constituents will rapidly decrease through natural processes.

There are 11 wells on the NSC Smelter, LLC property in the vicinity of the WSI that monitor groundwater to characterize groundwater flow and migration of constituents. Six of the wells have been the focus of ongoing sampling by GeoPro LLC since 2005. The most recent monitoring report available is from September 2017. Figure 2.2-1 shows the general trend of groundwater flow off the bluffs to the north, then southwest roughly parallel to the Columbia River. Constituents of concern include fluoride, chloride, sulfate, and total cyanide. Sulfate and fluoride are generally above the lowest groundwater protection standard, and chloride and total cyanide are below those standards in downgradient wells (Table 2.2-3). In all cases, levels have decreased since closure of the WSI (GeoPro LLC 2017).

Table 2.2-3: September 2017 Groundwater Monitoring Data

	Upper Confidence Limit (mg/L)[a]			
	Sulfate	Chloride	Fluoride	Total Cyanide
Lowest Groundwater Protection Standard (mg/L)	250	250	0.96	0.2
Upgradient				
MW-8A	9.15	4.48	0.64	0.01
Downgradient				
MW-3B	**2272.33**	107.57	2.31	0.01
MW-10A	**1958.75**	66.96	**3.42**	0.03
MW-12Aa	**1800**	150	**6**	0.01
MW-14A	**3954.35**	111.87	**20.22**	0.11
MW-18	**1496.25**	82.88	2.84	0.01

Source: GeoPro LLC 2017

mg/L = microgram per liter

Upper Confidence Limit (UCL) is a tool (Model Toxics Control Act [MTCA]; WAC 173-340-920) for assessing whether data exceeds established cleanup levels by comparing data to UCLs calculated on the mean. The UCL for each parameter at each well was calculated using the post-closure data, and the calculated UCL was compared to the MTCA cleanup level and MCL for each analyte to assess whether groundwater protections standards are being met.

[a] No UCL calculated. Well was dry during most sampling events. Value represents single measurement collected on March 13, 2007.

[b] No UCL calculated; all data was non-detect.

Bold indicates UCL exceeds lowest groundwater protection standard.

Created By: Kelly Lyons Date: 11/12/2019 Project: 0483340

M:\Projects\Goldendale Energy Storage Project\maps\DLA 2019\Figure 2.2-3 Groundwater.mxd

Tailrace Tunnel

Access Tunnel

Multi-Use Tunnel

Water Supply Valve House

MW-8A

MW-17A

MW-16A

MW-6B

MW-15A

MW-14A

MW-10A

460 ft

440 ft

420 ft

400 ft

Lower Reservoir

MW-12A

380 ft

MW-3B

360 ft

340 ft

MW-18

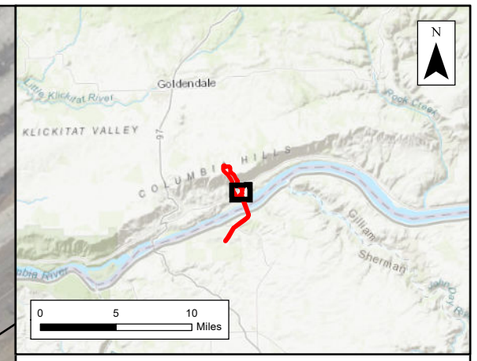
Substation

John Day Dam Rd

14

0 500 1,000 Feet

Source: National Agricultural Imagery Program, July 2017, flown 1m per pixel; NAD 1983 StatePlane Washington South FIPS 4602 Feet



Legend

- GeoPro LLC Monitoring Well
- GeoPro LLC Estimated Groundwater Contours
- Project Boundary

Proposed Infrastructure

- Access Road
- High Voltage Cable
- Transmission Line
- Transmission Co-Located with Existing BPA ROW
- Existing Access Road
- Reservoir
- Reservoir Berm Outer Slope
- Laydown Area
- Powerhouse
- Substation
- Water Supply Valve House
- Access Tunnel
- Access Tunnel Portal
- Headrace/Tailrace Tunnel

Figure 2.2-1
Groundwater Contours in the Vicinity of the Lower Reservoir
Draft License Application
Goldendale Energy Storage Project
Goldendale, WA

Environmental Resources Management
www.erm.com
ERM

Due to the semi-arid classification for the Project area and the short duration of construction prior to placement of an impermeable liner in each of the upper and lower reservoirs during construction, the potential for a discernible effect on the shallow aquifers at each location during construction is minimal. The impermeable liner system will be designed to prevent leakage from the reservoirs. Therefore, no significant effects to groundwater quality are expected from infiltration in the northern reservoir or penstock areas.

2.2.5 Wetlands

The Project is not expected to cause any impacts to wetlands within or adjacent to the Project area, including to intermittent streams or the Columbia River.

2.3 Applicant Recommendations

The Applicant will develop plans to address erosion associated with all aspects of Project construction via a Soil Erosion Control Plan. Using best management practices (BMPs) endorsed by the state of Washington, the plan will describe requisite erosion control measures to ensure that impacts are minimized.

The Applicant proposes development of an operational adaptive water quality monitoring and management program to monitor the gradual process of solute concentration in the proposed reservoirs due to the closed-loop nature of the system.

The Applicant will develop a Hazardous Substances Spill Prevention and Cleanup Plan to address potential issues resulting from spills of hazardous substances during construction, operations, or maintenance. The Hazardous Substances Spill Prevention and Cleanup Plan will specify materials handling procedures and storage requirements, and identify spill cleanup procedures for areas and processes in which spills may potentially occur. The plan will standardize process operations procedures and employee training in an effort to minimize accidental pollutant releases that could contaminate surface water, groundwater, or stormwater runoff. The Hazardous Substances Spill Prevention and Cleanup Plan will be filed with the Federal Energy Regulatory Commission (FERC) 1 year after license issuance and will be implemented at the start of construction.

3.0 FISH, WILDLIFE, AND BOTANICAL

3.1 Fish and Aquatic Resources

3.1.1 Existing Environment

This section describes fish and aquatic resources in the Project Boundary (within small ponds and intermittent streams) and in the Columbia River, which is crossed aerially by the Project Boundary. Potential impacts of the Project on fish and aquatic resources are also discussed in this

section. The Project is closed-loop and off-river, and as such will not directly affect naturally occurring aquatic resources during construction or operations.

Initial fill and periodic make-up water will be purchased from KPUD, which owns a surface water right to withdrawal from the KPUD Intake Pool. Interactions between the Project and fish habitat are limited to the indirect effects associated any land-disturbing activities in the watershed of intermittent or perennial waterbodies.

The assessment of fish and aquatic resources in the Columbia River relied largely on syntheses of existing data and review of the extensive scientific studies available for the Columbia River system.

3.1.1.1 Fisheries Management

The Project area is located in two HUCs: Middle Columbia-Lake Wallua and Klickitat. Both of these HUCs contain essential fish habitat (EFH) for Chinook salmon and coho salmon in the Columbia River. EFH is defined by the Magnuson-Stevens Fishery Conservation and Management Act as "those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity." The Project will not have any direct impacts on the Columbia River and therefore will not impact EFH for Chinook or coho salmon.

3.1.1.2 Project Boundary Resources

There is no fish habitat within the Project Boundary aside from the Columbia River, which is spanned by the Project's use of the BPA transmission right-of-way. Tadpoles were observed in stock pond P2 (see Figure 2.1-1A in Section 2.0 above) in the upper reservoir area during the 2019 wetland delineation. As such, there is potential amphibian habitat associated with the intermittent/ephemeral streams, as observed during the 2019 wetland delineation. This amphibian habitat would be seasonal, and primarily low quality, located within the intermittent/ephemeral channels, and on the fringes of the stock ponds in the upper reservoir area.

3.1.1.3 Columbia River Resources

Fish

The fish community in the Columbia River near the Project Boundary includes at least 52 documented species, including those with both resident (non-anadromous), adfluvial (spawn in river and rear in lake), and anadromous (spawn in freshwater and rear in the ocean) life histories (Ward 2001; USFWS 2014), as well as introduced species. Table 1 in Attachment 1 provides a summary of fish species documented from online data sources (e.g., Washington Department of Fish & Wildlife [WDFW]).

The Columbia River near the Project Boundary provides migratory habitat for anadromous Chinook (*Oncorhynchus tshawytscha*), coho (*Oncorhynchus kisutch*), and sockeye salmon (*Oncorhynchus nerka*); steelhead (*Oncorhynchus mykiss*); Pacific lamprey (*Entosphenus tridentata*); river lamprey (*Lampetra ayresi*); and American shad (*Alosa sapidissima*).

The Columbia River near the Project Boundary provides habitat for all life-history stages (i.e., spawning, rearing, migration, egg incubation, and overwintering) for nearly all resident cool and warm water species, as shown in Table 2 of Attachment 1. White sturgeon (*Acipenser transmontanus*) are found in the Columbia River near the Project Boundary and represent an important sport fishery. White sturgeon spawning and egg incubation habitat, however, is not likely to be present due to this species requirement for lotic habitat during these life stages.

Other important resident game fish species include American shad (*Alosa sapidissima*), bluegill, black crappie (*Pomoxis nigromaculatus*), largemouth bass, smallmouth bass, pumpkinseed (*Lepomis gibbosus*), walleye, white crappie (*Pomoxis annularis*), and yellow perch.

Amphibians

Several amphibian species may occur in the vicinity of the Columbia River near the Project Boundary, including the Columbia spotted frog (*Rana luteiventriz*), Pacific tree frog (*Hyla regilla*), Western toad (*Bufo boreas*), and the long-toed salamander (*Ambystoma macrodactylum*) (Titus 2019). The Oregon spotted frog is listed as endangered by Washington state (WDFW 2015a), and listed by USFWS as threatened, with proposed critical habitat (USFWS 2013) (discussed in more detail in Section 3.1.1.4).

Introduced or Non-Native Species

Many of the resident fish in the Columbia River near the Project Boundary have been introduced from other regions and are considered non-native. Introduced resident fish in the Columbia River system include species such as American shad, bluegill, pumpkinseed, largemouth and smallmouth bass, walleye, and yellow perch.

One introduced species of amphibian is known to occur in the Middle Columbia River, the bullfrog (*Rana catesbiana*) (PSU 2007). The bullfrog is native to other regions of North America and was introduced to the Middle Columbia region by an agency-approved fish and wildlife enhancement measure (PSU 2007).

Several species (at least 14) of introduced invertebrate have been documented in the Middle Columbia River. These include species of Oligochaete, Polychaete, Bryozoa, Isopoda, Decopoda, Amphipoda, Copepoda, Bivalve, and Gastropoda (PSU 2007). These have been introduced from Asia, Europe, New Zealand/Australia, and other parts of North America by vectors including aquaculture, ship ballast water, accidental introduction, release/stocking, and recreational fishing (PSU 2007).

3.1.1.4 Rare, Threatened, and Endangered Fish and Amphibian Species

WDFW lists fish species as either federally endangered, threatened, species of concern, or candidate; or state endangered, threatened, sensitive, or candidate within Klickitat County, Washington (WDFW 2018a, 2018c, 2019a; USFWS 2019). Additionally, state and federally listed amphibian species are discussed in 3.2.1.4, except for the Oregon spotted frog (*Rana luteiventriz*), which is discussed below.

Federally Listed Species

Fish species are often federally listed by specific evolutionarily significant unit (ESU) or distinct population segment. Fish listed as endangered that occur in the Columbia River include the Upper Columbia River spring-run ESU Chinook salmon (*Oncorhynchus tshawytscha*) and the Snake River ESU sockeye salmon (*Oncorhynchus nerka*) (WDFW 2018c, 2019a; USFWS 2019b). Fish listed as threatened that occur in the Columbia River include the Lower Columbia River ESU, Snake River fall-run ESU, and Snake River spring/summer-run ESU of Chinook salmon; bull trout/Dolly Varden (*Salvelinus confluentus*); Columbia River ESU chum salmon (*Oncorhynchus keta*); the Lower Columbia River ESU coho salmon (*Oncorhynchus kisutch*); and the Lower, Middle, and Upper Columbia and Snake River distinct population segments of steelhead (*Oncorhynchus mykiss*) (WDFW 2018c, 2019a; USFWS 2019b).

The river lamprey (*Lampetra ayresii*) is reported to occur in the Columbia River and is a federal species of concern (WDFW 2018c).

The Oregon spotted frog is listed by USFWS as threatened, with proposed critical habitat (USFWS 2013). The Oregon spotted frog is very dependent on waterbodies. They are almost always observed near a perennial water body with shallow water and emergent or floating aquatic vegetation (USFWS 2018c). These habitats do not occur in the Project area or Intake Pool as the surrounding perimeter of the Intake Pool is xeric habitat, lacking riparian cover and semi-aquatic habitat for amphibians.

State Listed Species

The Oregon spotted frog is listed as endangered by Washington state (WDFW 2018c), but no suitable habitat exists within the Project Boundary. Species that are candidates for State listing that WDFW Priority Habitats and Species (PHS) indicates occur in Klickitat County include the river lamprey, leopard dace (*Rhinichthys falcatus*), mountain sucker (*Catostomus platyrhynchus*), bull trout/Dolly Varden, Chinook salmon, chum salmonsteelhead, and sockeye salmon (WDFW 2018a, 2019a). There are no state-listed endangered or threatened fish species in Klickitat County, according to PHS (WDFW 2019a).

No additional aquatic species were included for the Oregon side of the Project (i.e., the transmission line) because the Project will not have any interactions with surface or ground water in Oregon.

3.1.2 Potential Resource Impacts

Construction of the proposed Project will directly impact the potential amphibian habitat associated with water features S7, S8, and P2 (see Figure 2.1-1 in Section 2.0 above). Section 2.0, Water Use and Quality, provides additional details on the impacts to these three waterbodies. All other waterbodies in the Project Boundary will be completely avoided and will not be impacted by Project construction or operations. There will be no direct effects to fish due Project construction activities, as there is no fish habitat within the Project Boundary (the Columbia River is crossed aerially by the BPA right-of-way within the Project Boundary).

The Project will utilize water purchased from KPUD to be withdrawn from the existing Intake Pool, which will be screened to National Marine Fisheries Service (NMFS) criteria (Figure 3.1-1). This water right was historically used by the CGA smelter and had a greater withdrawal rate than what will be used by the proposed Project. Therefore, the use of this water by the Project is not expected to have any impacts to water quantity and quality (and in turn fish and aquatic habitat).

3.1.2.1 Rare, Threatened, and Endangered Fish Species

There will be no impacts on special status fish species since none occur in surface waters potentially affected by Project construction or operations (intermittent waterbodies within the Project Boundary). There are also not expected to be impacts to the Oregon spotted frog, as no suitable habitat was identified for this species, including in the intermittent/ephemeral habitat associated with the waterbodies that will be impacted by the Project (ephemeral streams S7 and S8, and stock pond P2). As discussed above, the Oregon spotted frog is found near perennial waterbodies with emergent or floating vegetation.

3.1.3 Applicant Recommendations

This section identifies impact avoidance and minimization measures including BMPs that will be incorporated into the design/pre-construction, construction, and operational phases of the Project in order to avoid and/or minimize impacts to fish or aquatic resources and habitat.

- Avoid construction impacts to aquatic habitat wherever possible (including the intermittent/ephemeral streams and stock ponds).
- Use water diversion structures to direct dirty water from the work zone to a sediment control area.

- Install silt fencing, geotextile cloth, straw bales, berms, or other sediment control structures near waterbodies, including ephemeral waterbodies.
- Store soil, substrate, and building materials in stable areas away from waterbodies.
- Stabilize excavated materials and areas denuded of vegetation using temporary erosion control blankets, biodegradable mats, planted vegetation, or other erosion control techniques.
- Conduct environmental monitoring.
- Repair areas that are identified as potential sediment sources.
- Adhere to appropriate construction operating windows for instream work.

By following industry standard BMPs within the Soils Erosion Control Plan and Storm Water Pollution Prevention Plan, the potential effects of erosion and sedimentation on waterbodies, and therefore on fish and aquatic resources, will be appropriately mitigated.

3.2 Wildlife Resources

3.2.1 Existing Environment

The proposed Project Boundary is inhabited by a variety of common wildlife species, and provides a range of habitats between the low-lying areas of the lower reservoir and the higher-elevation sage-steppe and grassland steppe of the upper reservoir area. These habitat types are characterized with different vegetation, as described in detail in Section 3.3.1. Quality and availability of these habitats for wildlife use is limited within the proposed Project Boundary due to the past industrial use of the lower reservoir site, current grazing, fencing, wind generation use of the upper reservoir site, and associated prevalence of introduced and invasive weeds in much of the Project area (see the Botanical Report, Appendix C, Section 2.1.2).

The Project vicinity discussed for wildlife includes areas where wildlife could be directly or indirectly affected by adjacent Project activities, and takes into account far-ranging species such as mule deer (*Odocoileus hemionus hemionus*) and migratory birds that may traverse the Project Boundary.

3.2.1.1 Habitat

The proposed Project Boundary is primarily composed of previously disturbed lands, including the former CGA smelter lands of the lower reservoir area and disturbed shrub steppe habitat adjacent to wind development of the upper reservoir area. Project transmission lines within the existing BPA right-of-way will be added to existing transmission structures and, therefore, will not change available habitat on the Oregon side of the proposed Project Boundary.

Some habitat features found in the Project Boundary and vicinity support specific wildlife species requirements and are catalogued by WDFW as Priority Habitat features (WDFW 2015b),

and are mapped as part of the WDFW PHS Mapping (WDFW 2018a, 2019a). In 2019, Environmental Resources Management (ERM) conducted a botanical field survey that included visiting each PHS-mapped area to confirm or modify the boundaries. The PHS-mapped areas within the Project Boundary include:

- John Day Talus, described by WDFW as the talus slopes above John Day Dam (WDFW 2015b), occurs inside the Project Boundary and vicinity. Approximately 60.3 acres of talus slopes occur within the Project Boundary (WDFW 2018a, 2019a). WDFW defines talus as homogenous areas of rock rubble ranging from 0.5 to 6.5 feet in diameter composed of basalt, andesite, and/or sedimentary rock, including riprap and mine tailings. These areas are often associated with cliffs. Talus provides habitat for species such as American pika (*Ochotona princeps*), Gapper's red-backed vole (*Clethrionyms gapperi*), yellow-bellied marmot (*Marmota flaviventris*), and others.

- John Day Cliffs, described by WDFW as the cliffs above John Day Dam (WDFW 2015b), occur in the Project vicinity, but not the Project Boundary. WDFW defines cliffs as areas greater than 25 feet high and occurring below 5,000 feet in elevation. Cliffs provide habitat for species that also occur in talus areas, as well as golden eagles (*Aquila chrysaetos*), prairie falcon (*Falco mexicanus*), American kestrel (*Falco sparverius*), common raven (*Corvus corax*), and other cliff-nesting species.

- Oak woodland habitat—The PHS Mapper (WDFW 2018a) maps three areas of Oregon white oak (*Quercus garryana*) woodlands within the Project Boundary: near the upper reservoir, in the steep section between the upper and lower reservoirs, and in the lower reservoir area (WDFW 2018a). ERM confirmed during the 2019 field survey that these PHS-mapped areas are not oak woodlands, and no additional oak woodland habitat was identified in or near the Project Boundary.

- The John Day Waterfowl Area, a regular winter waterfowl concentration area, is in the Project vicinity to the south of the lower reservoir area. Species utilizing this area include Canada geese (*Branta canadensis*), diving ducks, dabbling ducks, and other waterfowl.

- On the Oregon side of the Project, the transmission line crosses over grassland Oregon strategy habitat (ODFW 2017). The Oregon Department of Fish and Wildlife (ODFW) defines this habitat as:

    - Grasslands generally occur on dry slopes or plateaus with well-drained sandy or loamy soils. Although dominant species vary across Oregon, perennial bunchgrasses and forbs dominate native grasslands. In some areas, grasslands are similar to wet prairies and wet meadows in structure and share some of the same prairie-associated plants and animals (wet prairies and wet meadows are included within the wetlands Oregon strategy habitat). In all but the shallowest rocky soils, grasslands are maintained through disturbances, such as periodic fire, soil upheaval by rodents, frost heave, wind, or salt spray.

- Another Oregon strategy habitat is also crossed by the transmission line: sagebrush (ODFW 2017). ODFW defines this habitat as:

    - Sagebrush-dominated communities differ greatly in structure and species composition, depending on ecoregion, elevation, soils, moisture regimes, and fire history. In general, sagebrush habitats occur on dry flats and plains, rolling hills, rocky hill slopes, saddles, and ridges where precipitation is low.

    - Sagebrush steppe is dominated by grasses and forbs (more than 25 percent of the area) with an open shrub layer. In sagebrush steppe, natural fire regimes historically maintained a patchy distribution of shrubs and predominance of grasses. In shrub-steppe habitats of the Columbia Plateau and Blue Mountains ecoregions, a soil crust (called a microbiotic or cryptogrammic crust) composed of lichens, mosses, fungi, and bacteria reduces soil erosion and moisture loss.

    - Sagebrush shrublands are dominated by shrubs, with less area covered by grasses and forbs than in steppe habitats. In many, but not all, sagebrush shrublands, natural fire regimes created a mosaic of stand ages and structures.

Botanical field surveys to ground-truth WDFW PHS data in the study area were conducted by ERM in 2019 (Figure 2.2-1 of the Botanical Report, Appendix C). Survey results confirmed that John Day Talus is present in the study area and is geographically consistent with WDFW PHS mapping. However, while these areas are true to the WDFW definition of John Day Talus PHS, the presence of introduced upland vegetation such as cheatgrass (*Bromus tectorum*), and Canada thistle (*Cirsium arvense*) indicate this habitat is not of high quality. Common fiddleneck (*Amsinckia micrantha* Sudsk.) is also abundant in this area and, while native, is considered to be an indicator species of disturbed land. Oak Woodland Habitat PHS was not observed within the study area. Stands of Ponderosa pine (*Pinus ponderosa*) and western juniper (*Juniperus occidentalis*) were observed within mapped PHS boundaries in the upper and lower reservoir areas and the middle escarpment, but no Oregon white oak or other oak species were observed within the study area. John Day Cliffs PHS was confirmed in the study area and is geographically consistent with WDFW PHS mapping.

Important Bird Areas (IBAs) are sites that provide essential habitat to one or more bird species (including federally protected birds) during a portion of the year (e.g., during breeding, wintering, and/or migrating). Areas that qualify as an IBA must support at least one of the following species (National Audubon Society 2015b):

- Species of conservation concern (e.g., threatened, endangered, or rare species);
- Species with a limited or restricted range;
- Vulnerable species because their populations are concentrated in one habitat type; or
- Species that are vulnerable because they occur at high concentrations due to congregation.

IBAs are ranked at either the global, continental, or state-level depending on their importance to a bird species and could be present on public or private lands, or both, and may or may not be protected. The proposed Project Boundary and vicinity is included in the Columbia Hills IBA, designated by the National Audubon Society (National Audubon Society 2015a; Ecology and Environment 2006). This area covers much of southern Klickitat County, ranging from the Klickitat River east to Rock Creek. The IBA excludes developed areas along State Route 14.

3.2.1.2 Terrestrial Wildlife

Ecology and Environment, Inc. conducted habitat and wildlife studies in 1996 for Conservation and Renewable Energy System (CARES) and Kenetech Windpower, Inc (Ecology and Environment 2006), and in 2005 in conjunction with the development of Windy Point wind farm. Both of these studies included land adjacent to the proposed upper reservoir location. Table 3.2-1 provides a summary of mammal and reptile species observed during the Windy Point environmental surveys in this area adjacent to the upper reservoir location, including the year(s) each species was observed. The CARES, Kenetech, and Windy Point studies did not include the lower reservoir area. Additional mammalian or reptile species diversity beyond what is listed above is not likely to be found in the proposed lower reservoir location due to the historical presence of the CGA smelter and its associated units.

Table 3.2-1: Terrestrial Wildlife Species Observed in the Windy Point Project Area, Adjacent to the Goldendale Energy Storage Upper Reservoir Location

Common Name	Scientific Name	Year Observed
Mammals		
Badger	*Taxidea taxus*	1995[a]
Bobcat	*Lynx rufus*	1995[a]
Columbian black-tailed deer	*Odocoileus hemionus columbianus*	1995[a], 2002[b], 2005[a], 2019[c]
Columbian ground squirrel	*Citrullus columbiana*	1995[a], 2005[a]
Coyote	*Canis latrans*	1995[a], 2005[a], 2019[c]
Deer mouse	*Peromyscus maniculatus*	1995[a]
Great Basin pocket mouse	*Perognathus parvus*	1995[a]
Northern pocket gopher	*Thomomys talpoides*	1995[a]
Nuttall's cottontail	*Sylvilagus nuttallii*	1995[a]
Porcupine	*Erethizon dorsatum*	1995[a], 2019[c]
Raccoon	*Procyon lotor*	1995[a]
Red fox	*Vulpes fulva*	1995[a]
Shrew	*Sorex spp.*	1995[a]
Striped skunk	*Mephitis*	1995[a]
Voles	*Microtis*	1995[a], 2005[a]
Weasel	*Mustela spp.*	1995[a]
Yellow-bellied marmot	*Marmota flaviventris*	1995[a], 2019[c]
Reptiles		

Common Name	Scientific Name	Year Observed
Gopher snake	*Pituophis melanoleucus*	1995[a], 2005[a]
Racer snake	*Coluber constrictor*	1995[a]
Rubber boa	*Charina bottae*	2005[a], 2019[c]
Short-horned lizard	*Phrynosoma douglassi*	1995[a], 2005[a]
Southern alligator lizard	*Elgaria multicarinata*	2019[c]
Western fence lizard	*Sceloporus occidentalis*	1995[a], 2005[a]
Western garter snake	*Thamnophis elegans*	1995[a], 2005[a]
Western rattlesnake	*Crotalus viridis*	1995[a], 2005[a]

Sources:

[a] Ecology and Environment 2006—Windy Point Project Site species (1995 date undetermined; May 3 -7, July 15-17, and August 23, 2005)

[b] WEST 2006—Appendix A1; Windy Point Project Site species (February 14 and April 11, 2002)

[c] ERM observations during 2019 site visits

The ODFW reported areas of concern for terrestrial species in the vicinity of the proposed transmission line; these areas of concern include deer and elk winter ranges, small mammal linkage priority habitat, and large mammal linkage priority habitat (ODFW 2014). Several ODFW strategy terrestrial wildlife species have summer, winter, or year-round distributions crossed by the transmission line (ODFW 2017). Summer distribution is crossed for the hoary bat (*Lasiurus cinereus*). Year-round distribution is crossed for the western toad (*Anaxyrus boreas*), California myotis (*Myotis californicus*), long-legged myotis (*Myotis volans*), pallid bat, white-tailed jackrabbit (*Lepus townsendii*), western gray squirrel (*Sciurus griseus*), silver-haired bat (*Lasionycteris noctivagans*), and the western pond turtle (*Actinemys marmorata*).

The WDFW manages about 1 million acres of land across 33 wildlife areas in the state of Washington. There are no designated wildlife areas overlapping the Project area. The closest wildlife area is approximately 12 miles northwest of the Project and includes the Goldendale Hatchery Wildlife Area Unit (WDFW 2019e).

Species occurring within the Project area that are important for their commercial or recreational value include big game species such as black-tailed deer, mule deer, and elk. Other smaller mammal species such as bobcat, coyote, hare, and raccoon are trapped in the Project vicinity and other game such as waterfowl, geese, and pheasants are hunted in the Project vicinity. Species important to the nearby Yakama Indian Nation for food and other cultural reasons include mule deer, elk, pheasant, quail, chuckar, ducks, geese, coots, snipes, mourning dove, and cottontail rabbit (Yakama Nation 2019a, 2019b).

Some of these species occur in the Project area and vicinity year round, and others migrate in and out depending on the season. Deer populations residing in Washington normally live within a 0.5 to 3 square mile radius, but move to lower elevations for the winter to avoid deep snowpack (WDFW 2019f). In the winter, Rocky Mountain mule deer are estimated to occur in the Klickitat

Basin at 30 to 78 deer per square km (WDFW 2016). The population has declined in recent years.

The Project area is located between two elk herd regions, the Mount Saint Helens herd to the west (closer to the Project area) and the Yakima herd to the east (WDFW 2006). Elk observed within the Project area will be rare and migrants. The estimated population size from 1996 to 2005 of the Mount Saint Helens herd was 13,300; however, this population is continuing to decline (WDFW 2006).

3.2.1.3 Birds

The National Audubon Society reports that 13 or more raptor species have been documented in the Columbia Hills IBA, including bald eagle (*Haliaeetus leucocephalus*), peregrine falcon (*Falco peregrinus*), golden eagles, and Swainson's hawk (*Buteo swainsoni*). Passerine species include Lewis's woodpecker (*Melanerpes lewis*), Brewer's sparrow (*Spizella breweri*), Harris's sparrow (*Zonotrichia querula*), and long-billed curlew (*Numenius americanus*); a variety of waterfowl and water birds are also known to utilize this IBA (National Audubon Society 2015a).

The John Day Waterfowl Area, a regular winter waterfowl concentration area, is in the Project vicinity, to the south of the lower reservoir area. Species using this area generally include Canada geese, diving ducks, dabbling ducks, and other waterfowl. Use of the Project area by water fowl and water birds is expected to be primarily by gulls and Canada geese, based on wind studies in the Project vicinity (WEST 2006, 2008). WEST reported very little to no use of the upper reservoir area by water birds or waterfowl in the summer and fall, with use being highest in spring (gulls), followed by winter, due to use by Canada geese (WEST 2006).

ODFW also reports a peregrine falcon nesting site in the vicinity of the originally proposed transmission line (ODFW 2014; KPUD 2012). Several ODFW strategy avian species have summer, winter, or year-round distributions crossed by the transmission line (ODFW 2017). Summer distribution is crossed for Brewer's sparrow, Caspian tern (*Hydroprogne caspia*), chipping sparrow (*Spizella passerina*), common nighthawk (*Chordeiles minor*), loggerhead shrike (*Lanius ludovicianus*), long-billed curlew, olive-sided flycatcher (*Contopus cooperi*), and Swainson's hawk. Winter distribution is crossed for the northern goshawk (*Accipiter gentilis*). Year-round distribution is crossed for the acorn woodpecker (*Melanerpes formicivorus*), great gray owl (*Strix nebulosa*), Lewis's woodpecker, and short-eared owl (*Asio flammeus*).

Spatial PHS data provided by WDFW identified a prairie falcon nesting site on the steep bluffs between the upper and lower reservoirs in 1997 (Nest #288; WDFW 2014a). Prairie falcons were observed in the Project vicinity in 1998 (Erickson et al. 1999), 2002, and 2008 (WEST 2006, 2008). The WDFW 2019 surveys documented two adults displaying courtship behavior and confirmed an occupied nest with no young (Nest #288; WDFW 2019d).

Table 3.2-2 provides a summary of bird species observed during the Windy Point environmental surveys in and adjacent to the upper portion of the Project area.

Table 3.2-2: Bird Species Observed in the Project Area and Vicinity

Common Name	Scientific Name	Year Observed
American crow	*Corvus brachyrhynchos*	2002[a], 2002[b], 2005[c]
American goldfinch	*Carduelis tristis*	1998[e], 2002[b]
American kestrel	*Falco sparverius*	1998[e], 2002[a], 2002[b], 2005[c], 2008[d]
American pipit	*Anthus spinoletta*	1998[e]
American robin	*Turdus migratorius*	1998[e], 2002[a], 2002[b], 2005[c], 2008[d]
American wigeon	*Anas americana*	2002[a]
Ash-throated flycatcher	*Myiarchus cinerascens*	1998[e], 2002[b]
Bald eagle	*Haliaeetus leucocephalus*	1998[e], 2002[a], 2008[d]
Barn swallow	*Hirundo rustica*	1998[e], 2002[b], 2005[c]
Bewick's wren	*Thryomanes bewickii*	2002[a], 2002[b]
Black-billed magpie	*Pica pica*	1998[e], 2002[a], 2002[b], 2005[c], 2008[d]
Brewer's blackbird	*Euphagus cyanocephalus*	2002[b]
Brewer's sparrow	*Spizella breweri*	2002[b]
Bohemian waxwing	*Bombycilla garrulus*	1998[e]
Brown-headed cowbird	*Molothrus ater*	1998[e], 2002[b]
Bullock's oriole	*Icterus bullockii*	1998[e], 2002[b]
California gull	*Larus californicus*	2002[b]
California quail	*Callipepla californica*	2002[a], 2002[b], 2005[c]
Canada goose	*Branta canadensis*	1998[e], 2002[a], 2002[b], 2008[d]
Canyon wren	*Catherpes mexicanus*	1998[e], 2002[a]
Cassin's finch	*Carpodacus cassinii*	1998[e]
Chipping sparrow	*Spizella passerina*	1998e, 2002[a], 2002[b]
Chukar	*Alectoris chukar*	1998[e], 2002[a], 2008[d]
Clark's nutcracker	*Nucifraga columbiana*	1998[e]
Cliff swallow	*Petrochelidon pyrrhonota*	1998[e], 2002[b]
Common raven	*Corvus corax*	1998[e], 2002[a], 2002[b], 2008[d]
Common nighthawk	*Chordeiles minor*	2005[c]
Cooper's hawk	*Accipiter cooperi*	1998[e]
Dark-eyed junco	*Junco hyemalis*	1998[e], 2002[a], 2002[b], 2008[d]
Downy woodpecker	*Picoides pubescens*	2002[a]
European starling	*Sturnus vulgaris*	1998[e], 2002[a], 2002[b], 2008[d]
Ferruginous hawk	*Buteo regalis*	2002[b]
Forster's tern	*Sterna forsteri*	2002[b]

Common Name	Scientific Name	Year Observed
Golden eagle	*Aquila chrysaetos*	1998[e], 2002[a], 2002[b], 2008[d]
Golden-crowned kinglet	*Regulus satrapa*	1998[e], 2002[a], 2002[b]
Golden-crowned sparrow	*Zonotrichia atricapilla*	2002[a], 2002[b]
Grasshopper sparrow	*Ammodramus savannarum*	1998[e]
Gray flycatcher	*Empidonax wrightii*	1998[e]
Gray partridge	*Perdix perdix*	1998[e], 2002[a], 2002[b], 2008[d]
Gray-crowned rosy finch	*Leucosticte tephrocotis*	1998[e]
Gull (unidentified species)	*Larus sp.*	1998[e], 2002[b]
Hairy woodpecker	*Picoides villosus*	2002[a]
Hermit thrush	*Catharus guttatus*	1998[e]
Horned lark	*Eremophila alpestris*	1998[e], 2002[a], 2002[b], 2005[c], 2008[d]
House finch	*Carpodacus mexicanus*	2002[b]
Killdeer	*Charadrius vociferus*	1998[e], 2002[a], 2002[b], 2005[c]
Lark sparrow	*Chondestes grammacus*	1998[e], 2002[b]
Lazuli bunting	*Passerina amoena*	1998[e], 2002[b]
Lesser goldfinch	*Carduelis psaltria*	2002[b]
Lewis's woodpecker	*Melanerpes lewis*	1998[e], 2002[b], 2005[c]
Loggerhead shrike	*Lanius ludovicianus*	1998[e]
Long-billed curlew	*Numenius americanus*	2005[c]
Mallard	*Anas platyrhynchos*	2002[a]
Merlin	*Falco columbarius*	1998[e], 2002[b]
Mountain bluebird	*Sialia currucoides*	1998[e], 2002[a], 2008[d]
Mourning dove	*Zenaida macroura*	2002[b], 2005[c]
Nighthawk	*Chordeiles minor*	1998[e]
Northern flicker	*Colaptes auratus*	1998[e], 2002[b], 2008[d]
Northern harrier	*Circus cyaneus*	1998[e], 2002[a], 2002[b], 2005[c], 2008[d]
Northern rough-winged swallows	*Stelgidopteryx serripennis*	2002[b]
Northern shrike	*Lanius excubitor*	1998[e], 2002[a], 2008[d]
Osprey	*Pandion haliaetus*	1998[e], 2002[b]
Prairie falcon	*Falco mexicanus*	1998[e], 2002[a], 2002[b], 2008[d]
Red-breasted nuthatch	*Sitta canadensis*	1998[e]
Red crossbill	*Loxia curvirosta*	1998[e]
Red-tailed hawk	*Buteo jamaicensis*	1998[e], 2002[a], 2002[b], 2005[c], 2008[d]
Red-winged blackbird	*Agelaius phoeniceus*	2002[a], 2002[b]
Ring-billed gull	*Larus delawarensis*	2002[b]
Ring-necked pheasant	*Phasianus colchicus*	1998[e], 2002[a], 2002[b], 2005[c]
Rock wren	*Salpinctes obsoletus*	1998[e], 2002[b]

Common Name	Scientific Name	Year Observed
Rough-legged hawk	*Buteo lagopus*	1998[e], 2002[a], 2008[d]
Rufous hummingbird	*Selasphorus rufus*	1998[e]
Savannah sparrow	*Passerculus sandwichensis*	1998[e]
Say's phoebe	*Sayornis saya*	1998[e], 2002[a], 2002[b]
Sharp-shinned hawk	*Accipiter striatus*	1998[e], 2002[a], 2008[d]
Song sparrow	*Melospiza melodia*	2002[b]
Spotted sandpiper	*Actitis macularia*	2002[b]
Spotted towhee	*Pipilo maculatus*	1998[e], 2002[b]
Swainson's hawk	*Buteo swainsoni*	2002[b], 2005[c]
Townsend's solitaire	*Myadestes townsendi*	1998[e], 2002[a], 2008[d]
Townsend's warbler	*Dendroica townsendi*	1998[e]
Tree swallow	*Tachycineta bicolor*	1998[e], 2008[d]
Turkey vulture	*Cathartes aura*	1998[e], 2002[b], 2005[c]
Varied thrush	*Ixoreus naevius*	1998[e]
Vesper sparrow	*Pooecetes gramineus*	1998[e], 2002[b], 2008[d]
Violet-green swallow	*Tachycineta thalassina*	2002[a], 2002[b]
Western bluebird	*Sialia mexicana*	1998[e], 2008[d]
Western kingbird	*Tyrannus verticalis*	2002[b], 2005[c]
Western meadowlark	*Sturnella neglecta*	1998[e], 2002[a], 2002[b], 2005[c], 2008[d]
Western wood-pewee	*Contopus virens*	1998[e], 2002[b]
Western tanager	*Piranga ludoviciana*	1998[e]
White-breasted nuthatch	*Sitta carolinensis*	1998[e]
White-crowned sparrow	*Zonotrichia leucophrys*	1998[e], 2002[a], 2002[b]
White-winged crossbill	*Loxia leucoptera*	1998[e]
Wilson's warbler	*Wilsonia pusilla*	2002[b]
Yellow-rumped warbler	*Dendroica coronata*	1998[e], 2002[b]

Sources:

[a] WEST 2006—Appendix A1; Windy Point Project Site species (February 14 and April 11, 2002)
[b] WEST 2006—Appendix A2; Klickitat County PEIS species (April 15 and July 12, 2002)
[c] Ecology and Environment 2006 — Windy Point Project Site species (May 3 -7, July 15-17, and August 23, 2005)
[d] WEST 2008—Windy Point II Wind Resource Area species (February 1 through March 26, 2008)
[e] Erickson et. al. 1999—CARES Wind Plant Site species (January – December, 1998)
PEIS = Preliminary Environmental Impact Statement

Golden Eagles

Golden eagles are known to occur within the Project Boundary and in the Project vicinity within the John Day Dam territory, with up to three historic golden eagle nest locations documented by WDFW within the Project area west of the proposed lower reservoir on the cliff face between the proposed reservoirs (Figure 3.2-1, filed as privileged information). Known golden eagle nest locations within the Project Boundary were surveyed by WDFW in June 2013, where they noted that one hunting adult was present with an unrepaired nest (Nest #413-6; WDFW 2014d);

surveys also occurred in 2014 and observations included one adult flying and the nest was unrepaired. Detailed analysis of home range use of a male golden eagle showed use largely within remaining open habits including the proposed lower reservoir Project area (WDFW 2015c).

The WDFW resurveyed the John Day Dam territory in 2019, where they observed a defensive pair (adult and subadult) with an unrepaired nest (Nest #413-4), and additional historic nest locations were not found (WDFW 2019c). Golden eagles use the same territory annually but may use alternate nests in different years (Watson and Whalen 2003). Further consultation with WDFW and USFWS will be conducted regarding application of an eagle take permit as discussed in Section 3.2.1.3 above.

Breeding populations of golden eagles are found in eastern and western Washington, and golden eagles migrate in winter from nesting populations in Canada and Alaska. WDFW has observed non-viability, poor recruitment, low-territory occupancy, and mortality of golden eagles due to wind development in the John Day Dam area (Watson 2019).

The following golden eagle information is referenced from the USFWS Interim Golden Eagle Technical Guidance (Pagel et al. 2010). Golden eagles are an upper-trophic aerial predator, eating small to mid-sized reptiles, birds, and mammals up to the size of mule deer fawns and coyote pups. They are also known to scavenge and utilize carrion. Golden eagles nest on cliffs, in the upper one third of deciduous and coniferous trees, or on artificial structures (windmills, electricity transmission towers, artificial nesting platforms, etc.). Golden eagles use the same territory annually but may use alternate nests in different years (Millsap et al. 2015; Watson et al. 2014a, 2014b; Watson and Whalen 2003). The critical breeding period for Washington's golden eagles begins with courtship in early January and ends with juvenile dispersal in mid- to late-August (Pagel et al. 2010; Watson and Davies 2009).

Documented flight paths of Geographic Positioning System (GPS)-tracked golden eagles in the Project vicinity indicate deer fawns, marmots, and other small mammals are main prey species (Watson 2015).

Figure 3.2-1: Golden Eagle Nests, Filed as Privileged Information

Bald Eagles

Bald eagles breed from central Alaska across Canada. Breeding populations are also found locally throughout the United States. Bald eagles are found primarily near coastlines, rivers, reservoirs, and lakes. Bald eagles principally eat fish, but also feed on carrion, waterfowl, and small mammals. They use large trees as nest sites and hunting perches. The nest building, egg laying and incubation, hatching and rearing, and fledging period for Washington's bald eagles is January 1 through August 15 (Watson and Pierce 1998; USFWS 2007). Bald eagles roost over the winter in the Columbia River Gorge, approximately October through March (Eisner 1991).

There are no bald eagle nests in close proximity to the proposed Project; however, bald eagles have been observed wintering near the John Day Dam in the Project vicinity. There are also no identified bald eagle communal roost or nesting site within or near the Project area. Only two observations of bald eagles were made during the 2008 winter bird surveys (WEST 2008), and bald eagle use of the upper reservoir area is considered minimal (Watson 2015). Bald eagle monitoring will occur as outlined in the Wildlife Management Plan (WMP; Appendix D).

3.2.1.4 Rare, Threatened, and Endangered Wildlife Species

USFWS maintains a list of wildlife species protected or considered for protection under the Endangered Species Act of 1973 (ESA) that may occur in Klickitat County, Washington and Sherman County, Oregon (USFWS 2019b). WDFW maintains lists of priority species that require protective measures for their survival due to their population status, sensitivity to habitat alteration, and/or recreational commercial, or tribal importance. Priority species include state threatened, endangered, or candidates for listing, as well as animal aggregations considered vulnerable, and vulnerable species of commercial, recreational, or tribal importance. ODFW lists their strategy species, which are species of greatest conservation need. Federal species of concern are identified by USFWS but do not receive protection under the ESA. These species have potentially declining populations and could require additional management or protection in the future. Additionally, native birds in the United States are protected by the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act.

Table 3.2-4 shows the species found in Klickitat County, Washington, and Sherman County, Oregon, that have been assigned a state endangered, threatened, sensitive, or candidate status, and/or a federal endangered, threatened, species of concern, or candidate status. A subset of these is expected to occur in or be transient through the proposed Project Boundary. WDFW and ODFW list four species of amphibians, seven species of reptiles, 30 species of birds and raptors, 19 mammals (including bats), and four invertebrates as either federally listed (endangered, threatened, species of concern, or candidate) and/or state-listed (endangered, threatened, sensitive or candidate) within Klickitat County, Washington, and Sherman County, Oregon (WDFW 2018a, 2018c, 2019a; USFWS 2019b; ODFW 2018; OBIC 2019).

Federally Listed Species

Of the ESA-listed species for the counties, only one is listed as federally endangered: the gray wolf (*Canis lupus*). Four species are federally listed as threatened: the northern spotted owl (*Strix occidentalis*), yellow-billed cuckoo (*Coccyzus americanus*), Canada lynx (*Lynx canadensis*), and Oregon spotted frog (*Rana pretiosa*) (the Oregon spotted frog is discussed above in Section 3.1.1.4). The northern spotted owl, yellow-billed cuckoo, Canada lynx, and Oregon spotted frog are unlikely to occur in the Project Boundary because their habitat is not present. The gray wolf could be present in the Project vicinity because they are habitat generalists. All others species are listed as federal candidate species or federal species of concern. Of these candidate species and species of concern, several have potential habitat within the Project vicinity or have been observed in the study area (see Table 3.2-4).

Federally listed species in Table 3.2-4 that have designated critical habitat include the Northern spotted owl, the yellow-billed cuckoo, Canada lynx, gray wolf, and the Oregon spotted frog (USFWS 2019b). None of these critical habitats are within the Project Boundary.

State-Listed Species

Of the state listed species for the counties, 7 species are listed as state endangered, 5 are listed as state threatened, 30 are listed as state candidate, and 42 are listed as state sensitive; however, many of the species are counted multiple times here because they are listed differently in Washington versus Oregon (see Table 3.2-3).

Table 3.2-3: Federal and State-Listed Wildlife Species for Klickitat County, Washington, and Sherman County, Oregon, Potentially Occurring in the Project Boundary

Common Name	Scientific Name	Federal Status	WA State Status	OR State Status	Habitat Description	Biological Opinions, Status Reports, and Recovery Plans	Temporal and Spatial Distribution in Project Vicinity
Birds							
Ferruginous hawk	*Buteo regalis*	--	T	S	Breed in grasslands, sagebrush, shrublands, and edges of pinyon-juniper forests (Cornell 2015). The species has been observed in the Project area or vicinity.	WA State Recovery Plan (WDFW 1996)	Spring/summer (breeding); Washington and Oregon east of the Cascade Mountains (Cornell 2015)
Flammulated owl	*Otus flammeolus*	--	C	--	The species breeds in open pine forests in mountains, and prefers ponderosa pine (Cornell 2015).	Management Recommendations for WA Priority Species (Larsen et al. 2004)	Spring/summer (breeding); Eastern slope of the Cascade Mountains (Larsen et al. 2004)
Golden eagle	*Aquila chrysaetos*	--	C	--	Breeding populations are found in eastern and western Washington, and golden eagles migrate in winter from nesting populations in Canada and Alaska. Golden eagles are known to occur within or near the Project Boundary, with a known nest located to the west of the proposed lower reservoir location.	Management Recommendations for WA Priority Species (Larsen et al. 2004)	Year-round; North-central Washington highlands, all of Klickitat County (Larsen et al. 2004)
Loggerhead shrike	*Lanius ludovicianus*	--	C	S	A breeding resident of shrub-steppe ecosystems; this species has been observed in the Project vicinity.	Management Recommendations for WA Priority Species (Larsen et al. 2004)	Spring/summer (breeding); Shrub-steppe zone in Washington, eastern Klickitat County (Larsen et al. 2004)

Common Name	Scientific Name	Federal Status	WA State Status	OR State Status	Habitat Description	Biological Opinions, Status Reports, and Recovery Plans	Temporal and Spatial Distribution in Project Vicinity
Pileated woodpecker	*Dryocopus pileatus*	--	C	--	They occur in nearly every type of woodland and can be found in suburban areas (Cornell 2015).	Management Recommendations for WA Priority Species (Larsen et al. 2004)	Year-round; Wooded areas of Washington (Larsen et al. 2004)
Sage thrasher	*Oreoscoptes montanus*	--	C	--	Breed exclusively in shrub-steppe habitats, generally dominated by big sagebrush; require dense ground cover (Cornell 2015)	Management Recommendations for WA Priority Species (Larsen et al. 2004)	Spring/summer (breeding); Columbia Basin shrub-steppe (Larsen et al. 2004)
Sagebrush sparrow	*Artemisiospiza nevadensis*	--	C	--	Breed in shrub-steppe of shrubs up to 6-feet tall, can nest in sagebrush-juniper habitat bordering sagebrush steppe; in winter migration use dry shrublands or grasslands (Cornell 2015)	Management Recommendations for WA Priority Species (Larsen et al. 2004)	Spring/summer (breeding); Central Washington sagebrush (Larsen et al. 2004)
Western burrowing owl	*Athene cunicularia hypugaea*	--	C	S	Open treeless areas with low sparse vegetation, grasslands, deserts, steppe environments (Cornell 2015)	Status Assessment and Conservation Plan (Klute et al. 2003)	Spring/summer (breeding); Central and eastern Washington (Klute et al. 2003)
White-headed woodpecker	*Picoides albolarvatus*	--	C	S	They occur in montane coniferous forests dominated by pine (Cornell 2015) and are known to associate with ponderosa pine.	Management Recommendations for WA Priority Species (Larsen et al. 2004); Conservation Assessment (Mellen-Mclean et al. 2013)	Year-round; Eastern slope of Cacade Mountains (Larsen et al. 2004)
Mammals							
Black-tailed jackrabbit	*Lepus californicus*	--	C	--	Shrubsteppe and grassland habitats of the semi-arid Columbia Plateau, extending into Oregon (WDFW 2012)	Washington's Comprehensive Wildlife Strategy (WDFW 2005)	Year-round; Columbia Plateau (WDFW 2012)

Common Name	Scientific Name	Federal Status	WA State Status	OR State Status	Habitat Description	Biological Opinions, Status Reports, and Recovery Plans	Temporal and Spatial Distribution in Project Vicinity
Gray wolf	*Canis lupus*	E	--	--	They are habitat generalists and can occur all over Washington (WDFW 2012).	50 CFR Part 17 21312, Proposed Removal from the List of Endangered and Threatened Wildlife; Wolf Conservation and Management Plan (Wiles et al. 2011)	Year-round; All of Washington (WDFW 2012)
Pacific Townsend's big-eared bat	*Corynorhinus townsendii*	--	C	--	Broad range of arid to moist habitats, lowland conifer-hardwood forest, montane conifer forest, ponderosa pine forest/woodland, shrub-steppe, riparian areas, and open fields (WDFW 2012)	Conservation Assessment in OR and WA (Gervais 2017)	Year-round; All of Washington (WDFW 2012)
Pallid Townsend's big-eared bat	*Corynorhinus townsendii pallescens*	--	C	--	Unknown—little data available	--	Unknown
Townsend's ground squirrel	*Spermophilis townsendii*	--	C	--	Shrub-steppe, grasslands, pastures; found in eastern Klickitat County (WDFW 2012)	Franklin, Richardson, Columbian, Washington, and Townsend Ground Squirrels (Askham 1994)	Year-round; Southcentral Washington, eastern Klickitat County (WDFW 2012; Askham 1994)
Western grey squirrel	*Sciurus griseus*	--	T	S	They have a distribution that is closely correlated with Oregon white oak habitat in Washington, probably due to squirrels' dependence on acorns as a winter food source. Known populations of western gray squirrel exist in the oak woodlands to the northeast of the study area (WDFW 2014a). This is a WDFW priority species that could occur within the Project area because its habitat is present.	Status Review (Wiles 2016)	Year-round; Oregon white oak habitat in Washington (WDFW 2014a)

Common Name	Scientific Name	Federal Status	WA State Status	OR State Status	Habitat Description	Biological Opinions, Status Reports, and Recovery Plans	Temporal and Spatial Distribution in Project Vicinity
White-tailed jackrabbit	*Lepus townsendii*	--	C	S	Prairies and the semi-arid portions of the Columbia Plateau (WDFW 2012)	WA Wildlife Action Plan (WDFW 2015d)	Year-round; Columbia Plateau (WDFW 2012)
Invertebrates							
Columbia Oregonian (snail)	*Cryptomastix hendersoni*	--	C	--	Seeps, spring-fed streams, east portion of Columbia River Gorge, under rocks and vegetation, can occur in hemlock forests and upland locations (Jordan and Black 2015)	Conservation Assessment (Jordan and Black 2015)	Year-round; Mainly freshwater bodies in east Columbia River Gorge (Jordan and Black 2015)
Juniper hairstreak	*Mitoura grynea barryi*	--	C	--	Old fields, bluffs, barrens, juniper and pinyon-juniper woodlands, and cedar breaks (Butterflies and Moths of North America 2018)	Species Fact Sheet (Miller and Voight 2011); WA Wildlife Action Plan (WDFW 2015d)	Year-round; Small pockets in southeastern Washington, Klickitat County (Miller and Voight 2011)
Mardon skipper	*Polites mardon*		E	--	Historic records come from Thurston, Klickitat, and Yakima counties in Washington. Its range is recently reported to be increasing. In 2011, a total of 111 sites were recorded in Washington State, with six sites in the Goldendale area. Depends on prairie grassland habitat (WDFW 2014b). This is a WDFW priority species that could occur within the Project area because its potential habitat is present.	Status Report (WDFW 1999)	Year-round; Klickitat County Goldendale area (WDFW 2014b)
Reptiles							
California mountain kingsnake	*Lampropeltis zonata*	--	C	--	Pine forests, oak woodlands, chaparral (ODFW 2019)	WA Wildlife Action Plan (WDFW 2015d)	Year-round; Columbia River Gorge (WDFW 2015d)

Common Name	Scientific Name	Federal Status	WA State Status	OR State Status	Habitat Description	Biological Opinions, Status Reports, and Recovery Plans	Temporal and Spatial Distribution in Project Vicinity
Northern sagebrush lizard	*Sceloporus graciosus*		C	S	Sand dunes (WDFW 2015d), sagebrush, chaparral, juniper woodlands, coniferous forests (ODFW 2019)	WA Wildlife Action Plan (WDFW 2015d)	Year-round; Columbia River Basin (WDFW 2015d)
Striped whipsnake	*Masticophis taeniatus*	--	C	--	Shrub-steppe habitat; however, it is limited to the driest areas of the Central Columbia Basin (WDFW 2012)	WA Wildlife Action Plan (WDFW 2015d)	Year-round; Columbia Basin (WDFW 2015d)
Western toad	*Anaxyrus boreas*	--	C	S	Potential habitat present in Project Boundary; wide range of habitat, forests, mountain meadows, desert flats (ODFW 2019).	WA Wildlife Action Plan (WDFW 2015d)	Year-round; All of Washington state (WDFW 2015d)

Sources: Butterflies and Moths of North America 2018; Cornell 2015; Duncan 2005; Jordan and Black 2014; OBIC 2019; ODFW 2018, 2019; USFWS 2019b, 2018b, 2018c; UW 2018; WDFW 2012, 2013, 2014a, 2014b, 2018a, 2018c, 2019a

-- = not listed; C = candidate; CFR = Code of Federal Regulations; Co = species of concern; E = endangered; T = threatened; S = sensitive; WA = Washington

Notes:

Species included in this table were listed in the Information, Planning, and Consultation System (IPaC) tool run on June 19, 2019, for the Project Area and/or WDFW's 2019 PHS List occurring in Klickitat County (WDFW 2019a). If species in these lists were also included in the 2019 Oregon Biological Information Center rare/threatened/endangered list for Sherman County, a status was included for Oregon (OBIC 2019). Federal statuses were confirmed using the USFWS Environmental Conservation Online System website for each individual species (USFWS 2019b).

Fully aquatic species such as fish and some invertebrates were not included in this table because no aquatic habitat will be disturbed as a result of this Project.

Note from the PHS List (WDFW 2018a):

These are the species and habitats identified for Klickitat County. This list of species and habitats was developed using the distribution maps found in the PHS List (see http://wdfw.wa.gov/conservation/phs/). Species distribution maps depict counties where each priority species is known to occur as well as other counties where habitat primarily associated with the species exists. Two assumptions were made when developing distribution maps for each species:

1) There is a high likelihood a species is present in a county, even if it has not been directly observed, if the habitat with which it is primarily associated exists.

2) Over time, species can naturally change their distribution and move to new counties where usable habitat exists.

Distribution maps in the PHS List were developed using the best information available. As new information becomes available, known distribution for some species may expand or contract. WDFW will periodically review and update the distribution maps in the PHS List.

3.2.2 Potential Resource Impacts

Potential impacts to wildlife habitat and species are described in this section; wildlife and habitat protection measures and BMPs are described separately in the FFP Project 101, LLC (Applicant) Recommendations Section 3.3.3 below.

3.2.2.1 Terrestrial Wildlife

During construction, the primary impacts on terrestrial wildlife will be noise and human activity associated with Project construction. Construction noise is expected to result from the use of equipment such as industrial trucks, drilling equipment, and blasting to remove bedrock for the reservoirs. Construction of Project features could adversely affect small mammals and reptiles on site through loss of habitat and mortality of individuals in construction zones. Ground-dwelling animals could be killed during excavation activities and will lose the use of permanently impacted areas such as the proposed reservoirs. Small mammal, reptile, or ground bird fatalities could occur from vehicle activity.

Visual and noise disturbance may displace wildlife into less suitable habitat and thus reduce survival and reproduction. Tolerance levels to disturbance can be species-specific. During construction, it is expected that mule deer will be displaced. Impacts are expected to be minimal because no portion of the Project area is classified as mule and black-tailed deer winter range (WDFW 2018a).

The removal and loss of vegetation can affect avian species directly by loss of nesting, foraging, and cover habitat.

3.2.2.2 Birds

Impacts due to Project construction and operations could include abandonment of the area and nests due to disturbance. Disturbance (visual and noise) may displace birds into less suitable habitat and thus reduce survival and reproduction. Avian tolerance levels to disturbance can be species-specific and are described in the WMP. The impact to bird species from disturbance or displacement from construction activities is likely to be short-term.

Avian mortalities can occur from vehicle activity during construction and operations.

Light pollution can affect migrating and nocturnal birds through disorientation, as well as breeding behavior and reproduction of songbirds (Cabrera-Cruz et al. 2018; Wiltscko et al. 1993; Kempenaers et al. 2010).

The USFWS and WDFW have commented that the creation of reservoirs may impact waterfowl and water birds by providing open water habitat thus increasing resting and foraging use of the area. The increased presence of these birds adjacent to existing wind turbines may increase the likelihood of mortality events. Although the Project reservoirs will not provide wildlife habitat

due to their industrial use, flow cycling between reservoirs, lack of substrate, and shape, the Applicant will employ methods such as shade balls to reduce the risk of avian species' attraction to the reservoirs, as described in the WMP. Ample water habitat is available in the Columbia River near the Project area.

3.2.2.3 Raptors

Raptor tolerance levels to disturbance can be species- and individual-specific. Golden eagles exhibit lower tolerance to disturbance compared to bald eagles (USFWS 2007). The potential impacts on the golden eagle are the removal of foraging habitat in the area of the upper reservoir, potential impact on nesting, and potentially forcing confrontation between pairs. Other raptors in the area such as red-tailed hawk, rough-legged hawk, and prairie falcon could experience a reduction in terrestrial foraging habitat and noise disturbance during construction.

In a 2014 letter (resent in 2019), the WDFW expressed concern about the loss of golden eagle foraging habitat from the reservoir footprints (WDFW 2019b). The total Project footprint will eliminate approximately 228 acres of vegetated habitat, more than half of which (123 acres) would be introducted and/or invasive types (Introduced Upland Vegetation—Annual Grassland (IUVAG) and Introduced/Invasive Wooded). The other approximately 105 acres would be primarily Inter-Mountain Basins Big Sagebrush Steppe (IMBBSS), and Columbia Plateau Steppe and Grassland (CPSG), which is plentiful in this region. Golden eagles are expected to utilize nearby available foraging habitat during and after Project construction.

Golden eagle disturbance or displacement is possible during Project construction and operation. Project construction may disturb golden eagles if they are nesting within line-of-sight of the Project or if the areas of active construction are preferred foraging areas. Golden eagles have been documented to continue to use the same focal areas of ranges before and after turbine construction and this may be the case for the proposed Project construction activities (Madders and Whitfield 2006). Monitoring of golden eagles during construction of a dam and reservoir over a 4-year period found no significant change in occupation or productivity in response to construction activities, particularly those associated with loud noise (Ecosphere Environmental Services 2007). Nests were located approximately 0.5 mile from the construction site, and most construction activity occurred outside of view from the nest. Season (i.e., breeding vs. non-breeding) and breeding status influence intensity of range use surrounding nests (Haworth et al. 2010; Watson et al. 2014a, 2014b).

Bald eagles primarily forage along the Columbia River and its associated riparian habitats. Bald eagle use of the upper reservoir area is minimal (Watson 2015). The Project's reservoirs could attract bald eagles (WDFW 2019b), which could adversely impact the golden eagles during nesting through increased stress and energy expenditures related to territory defense. However, protection, mitigation, and enhancement (PM&E) measures have been proposed to reduce the risk of bird attraction to the Project reservoirs (see Section 3.2.3 and the WMP in Appendix D).

Transmission lines pose an electrocution risk to large birds, such as eagles, if multiple lines can be touched by a bird at one time (i.e., if their wingspan can reach between two lines). Electrocution could cause injury or mortality to a large bird.

3.2.2.4 Rare, Threatened, and Endangered Wildlife Species

Birds

Federal and state-listed birds that have potential habitat within the Project vicinity include the ferruginous hawk, flammulated owl, golden eagle, western burrowing owl, loggerhead shrike, sage thrasher, sagebrush sparrow, pileated woodpecker, and white-headed woodpecker. Raptors are discussed above in Section 3.2.2.3.

Construction of the proposed Project may displace federal and state-listed birds. If construction activity starts after birds have begun nesting, nests may be abandoned or destroyed. Excavation, road improvements, and other vegetation-clearing activities can be timed to minimize disturbance to nesting birds. Without adequate protection and mitigation measures, nesting birds in the area may be displaced or disturbed by construction activities and/or operation the proposed Project. Protection and mitigation measures for birds are detailed in Section 3.2.3 and the WMP (see Appendix D).

Mammals

The federally endangered gray wolf is a habitat generalist and occurs all over the state of Washington (WDFW 2012). Wolves are not expected to be affected by the proposed Project because of the abundance of their available habitat in Washington. Gray wolves are generally averse to humans and will avoid Project-related activities.

The western gray squirrel has been documented within oak habitats in the Project vicinity (WDFW 2015a). These habitats will not be affected by the proposed Project. The potential exists for dispersing individuals to experience road fatalities from maintenance or construction vehicle traffic. However, dispersal events are rare, and the presence of western gray squirrels is not expected within the Project area. Additionally, impacts on dispersing gray squirrels will be minimized by posting speed limits for construction and maintenance vehicles.

Black-tailed jackrabbit and white-tailed jackrabbit are both candidates for state listing in Washington. Incidental direct and indirect impacts to jackrabbits, such as collisions with vehicles or equipment, could occur during Project construction and operations. Construction noises may displace jackrabbits from their preferred habitat.

Townsend’s ground squirrel is a candidate for state listing in Washington. Incidental direct and indirect impacts to ground squirrels, such as collisions with vehicles or equipment, could occur during Project construction and operations. Excavation could injure individuals in burrows. Construction noises may displace ground squirrels from their preferred habitat.

Pacific Townsend's big-eared bat and pallid Townsend's big-eared bat are both candidates for listing in Washington. Bats are prone to many of the same threats as avian species, including collision-related injuries and mortalities. Monitoring and reporting of suspected collisions, as well as remedial action, will reduce collision events over time if problem areas exist. Lighting will be minimized and construction activities may be limited to daylight hours to minimize disruption of nocturnal activities. Given adequate protection and mitigation measures, no Project-related effects are anticipated on bat populations in the Project vicinity.

Invertebrates

The Columbia Oregonian snail, a candidate for listing in Washington, may be directly or indirectly impacted by Project construction. Snail eggs and adults may be crushed during vegetation clearing, excavation, and heavy equipment movement.

Juniper hairstreak and Mardon skipper butterflies, a candidate for listing and an endangered Washington species respectively, could be directly and indirectly impacted during Project construction. All life stages may be crushed during vegetation clearing, excavation, and heavy equipment movement. Adult phases may also be impacted by Project noise and activity causing displacement or avoidance of the Project area.

Reptiles

California mountain kingsnake, northern sagebrush lizard, and striped whipsnake are all candidates for listing in Washington. Incidental direct and indirect impacts to xeric terrestrial reptiles, such as collisions of slow moving individuals with vehicles or equipment, could occur during Project construction and operations. Excavation could injure snakes in burrows. Construction noises may displace snakes from their preferred habitat.

Amphibians

The western toad, a candidate for listing in Washington, occupies a wide range of habitat types and occurs all over the state (WDFW 2015d). Western toad habitat is not expected to be directly affected by the proposed Project because of the abundance of their available habitat in Washington. Incidental direct and indirect impacts to western toads, such as collisions of slow moving individuals with vehicles or equipment, could occur during Project construction and operations.

3.2.3 Applicant Recommendations

This section identifies PM&E measures that will be incorporated into the design/pre-construction, construction, and operational phases of the Project in order to address impacts on wildlife, including rare, threatened, and endangered wildlife species. Temporary and permanent impacts on habitat are shown in Table 3.3-7. Protection measures are detailed in the WMP

(included as Appendix D of this DLA), and summarized here. The Applicant will continue to develop and refine these protection measures in consultation with the agencies.

3.2.3.1 Design/Pre-Construction Protection Measures

- Risk assessment of activity and timeline to determine the impacts of the Project during breeding and non-breeding seasons. Based on risk assessment, develop construction timing and scheduling limits (e.g., only allowing construction between 8 am and 6 pm) to minimize impacts to crepuscular foraging and nocturnal activity.
- Wildlife studies
    - Raptors—pre-construction raptor nest surveys, monitoring of golden eagle use, and bald eagle monitoring. Surveys will focus on known historic nest locations, including the three golden eagle nests located near the Project area. See the WMP (Appendix D) for detailed raptor survey methods.
    - Bats—the Project is not proposing pre-construction bat surveys but will instead rely on the surveys conducted for the nearby wind farms to document bat presence.
- Develop nest protection measures with agencies, if necessary.
- Design raptor-safe transmission line construction (i.e., ensure that the transmission line installation complies with Avian Power Line Interaction Committee (APLIC) guidelines for avian protection [APLIC and USFWS 2005] and the Suggested Practices for Avian Protection on Power Lines, The State of the Art in 2006 [APLIC 2006] to protect avian species from electrocution as a result of landing or perching on transmission and distribution lines [WDFW 2014c]).
- Reduce habitat loss by designing the Project to use existing access roads wherever possible.
- Habitat—the Project transmission line will utilize an available space on an existing BPA transmission right-of-way for the Columbia River crossing and the connection to the John Day substation in Oregon. Impacts on priority habitats of talus and cliffs will be largely avoided since the penstock, access tunnel, and emergency evacuation tunnel will be constructed underground using directional drilling techniques.

3.2.3.2 Construction Protection Measures

- Noise minimization by avoiding blasting within 0.5 mile of active nests.
- Raptor nest monitoring to ensure construction is avoiding protected/sensitive areas.
- Biological training program to inform employees of the sensitive biological resources.
- Manage traffic by implementing a speed limit to reduce wildlife injury due to collisions.

- Carcass removal program removes carcasses of livestock, big game, and other animals from the Project area that may attract scavenging wildlife, foraging eagles, or other raptors to limit attraction of scavenging wildlife.
- Reduce attraction for mammals (prey species) by using deterrents.
- Implement a wildlife incident reporting system to disclose issues to agencies.
- Dust pallatives may be applied to unpaved roads to reduce dust.

3.2.3.3 Operation Protection Measures

- Reduce attraction for migratory birds by using bird deterrents, vegetation management, and/or exploring the use of plastic shade balls to cover reservoirs.
- Manage light pollution to reduce impacts on migrating and nocturnal birds.
- Operate Project facilities in a manner that minimizes disturbance to wildlife populations.

3.3 Botanical Resources

3.3.1 Existing Environment

This section describes the vegetation types, invasive species, and rare or sensitive plants found in the Project Boundary or in the Project vicinity.

In 2015 and 2019, ERM conducted botanical field surveys that included the proposed Project Boundary in Washington, as well as areas in the Project vicinity. The 2015 study area is the area of mapped vegetation, and the the 2019 study area is the Project Boundary in Figure 3.3-1. In 2015, nine vegetation sample plots and several additional observation points were established to document species composition and percentage of cover. The 2019 Botanical Resources Report is included as Appendix C.

3.3.1.1 Invasive Species

Tables 3.3-1 and 3.3-2 present noxious weeds listed in Klickitat County, Washington, and Sherman County, Oregon, with their priority ranking for eradication, respectively. The focus of the 2015 vegetation field study was to map vegetation cover types within the study area. As such, the study did not include a formal comprehensive survey of noxious weeds or other invasive species, which are discussed below. Cheatgrass, Russian olive (*Eleagnus angustifolia*), and Himalayan blackberry (*Rubus armeneacus*) are introduced invasive species identified in the Project Boundary and vicinity during the 2015 and 2019 field visits but they are not listed as noxious weeds in Klickitat or Sherman Counties. Additional listed noxious weeds observed during the 2019 survey include Dalmatian toadflax (*Linaria dalmatica*), rush skeletonweed (*Chondrilla juncea*), herb-Robert (*Geranium robertianum*), and Canada thistle.

Table 3.3-1: 2017 State of Washington and Klickitat County Noxious Weeds Lists

Common Name	Scientific Name
WA State Class A Weeds	
broom, French	*Genista monspessulana*
broom, Spanish	*Spartium junceum*
common crupina	*Crupina vulgaris*
cordgrass, common	*Spartina anglica*
cordgrass, dense flower	*Spartina densiflora*
cordgrass, salt meadow	*Spartina patens*
cordgrass, smooth	*Spartina alterniflora*
dyers woad	*Isatis tinctoria*
eggleaf spurge *	*Euphorbia oblongata*
false brome	*Brachypodium sylvaticum*
floating primrose-willow	*Ludwigia peploides*
flowering rush	*Butomus umbellatus*
garlic mustard	*Alliaria petiolata*
giant hogweed *	*Heracleum mantegazzianum*
goatsrue	*Galega officinalis*
hydrilla	*Hydrilla verticillata*
johnsongrass *	*Sorghum halepense*
knapweed, bighead *	*Centaurea macrocephala*
knapweed, Vochin *	*Centaurea nigrescens*
kudzu	*Pueraria montana* var. *lobata*
meadow clary	*Salvia pratensis*
oriental clematis	*Clematis orientalis*
purple starthistle	*Centaurea calcitrapa*
reed sweetgrass	*Glyceria maxima*
ricefield bulrush	*Schoenoplectus mucronatus*
sage, clary	*Salvia sclarea*
sage, Mediterranean *	*Salvia aethiopis*
silverleaf nightshade	*Solanum elaeagnifolium*
spurge flax	*Thymelaea passerina*
Syrian bean-caper	*Zygophyllum fabago*
Texas blueweed	*Helianthus ciliaris*
thistle, Italian	*Carduus pycnocephalus*
thistle, milk	*Silybum marianum*
thistle, slenderflower	*Carduus tenuiflorus*
variable-leaf milfoil	*Myriophyllum heterophyllum*
wild four o'clock	*Mirabilis nyctaginea*
WA State Class B-Designate Weeds	
blueweed	*Echium vulgare*
Brazilian elodea	*Egeria densa*

Common Name	Scientific Name
bugloss, annual	*Anchusa arvensis*
bugloss, common	*Anchusa officinalis*
camelthorn	*Alhagi maurorum*
common fennel	*Foeniculum vulgare*
common reed, nonnative	*Phragmites australis*
fanwort	*Cabomba caroliniana*
gorse	*Ulex europaeus*
grass-leaved arrowhead	*Sagittaria graminea*
hawkweed oxtongue	*Picris hieracioides*
hawkweed, orange	*Hieracium aurantiacum*
herb-Robert *	*Geranium robertianum*
knapweed, black	*Centaurea nigra*
knapweed, brown	*Centaurea jacea*
knotweed, Bohemian *	*Polygonuym x bohemicum*
knotweed, giant *	*Polygonum sachalinense*
knotweed, Himalayan	*Polygonum polystachyum*
knotweed, Japanese *	*Polygonum cuspidatum*
loosestrife, garden	*Lysimachia vulgaris*
loosestrife, purple *	*Lythrum salicaria*
loosestrife, wand	*Lythrum virgatum*
Nonnative hawkweed species and hybrids of WALL subgenus	*Hieracium* subgenus, *Hieracium*
parrotfeather	*Myriophyllum aquaticum*
policeman's helmet	*Impatiens glandulifera*
saltcedar *(unless intentionally planted prior to 2004)	*Tamarix ramosissima*
shiny geranium	*Geranium lucidum*
spurge laurel	*Daphne laureola*
spurge, leafy *	*Euphorbia esula*
spurge, myrtle *	*Euphorbia myrsinites*
thistle, musk	*Carduus nutans*
thistle, plumeless	*Carduus acanthoides*
thistle, Scotch *	*Onopordum acanthium*
velvetleaf	*Abutilon theophrasti*
water primrose	*Ludwigia hexapetala*
white bryony	*Bryonia alba*
wild chervil	*Anthriscus sylvestris*
yellow archangel *	*Lamiastrum galeobdolon*
yellow floating heart	*Nymphoides peltata*
Klickitat County Class B-Weeds	
butterfly bush *	*Buddleia davidii*
Dalmatian toadflax *	*Linaria dalmatica* ssp. *dalmatica*
Eurasian watermilfoil *	Myriophyllum spicatum
hairy willow-herb *	*Epilobium hirsutum*

Common Name	Scientific Name
hoary alyssum *	*Berteroa incana*
houndstongue *	*Cynoglossum officinale*
indigobush *	*Amorpha fruticosa*
knapweed, diffuse *	*Centaurea diffusa*
knapweed, meadow *	*Centaurea x moncktonii*
knapweed, Russian *	*Acroptilon repens*
knapweed, spotted *	*Centaurea stoebe*
kochia *	*Kochia scoparia*
lesser celandine	*Ficaria verna*
Nonnative hawkweed species and hybrids of MEADOW subgenus	*Hieracium* subgenus, *Pilosella*
perennial pepperweed *	*Lepidium latifolium*
poison hemlock *	*Conium maculatum*
puncturevine *	*Tribulus terrestris*
Ravenna grass	*Saccharum ravennae*
rush skeletonweed *	*Chondrilla juncea*
Scotch broom *	*Cytisus scoparius*
sulfur cinquefoil *	*Potentilla recta*
tansy ragwort *	*Senecio jacobaea*
yellow nutsedge*	*Cyperus esculentus*
yellow starthistle *	*Centaurea solstitialis*
Klickitat County Class C Weeds	
Austrian fieldcress *	*Rorippa austriaca*
black henbane	*Hyoscyamus niger*
buffalobur *	*Solanum rostratum*
hairy whitetop *	*Cardaria pubescens*
hoary cress *	*Cardaria draba*
Italian arum	*Arum italicum*
jubata grass	*Cortaderia jubata*
longspine sandbur *	*Cenchrus longispinus*
Nonnative cattails and hybrids (does not include native Typha latifolia)	*Typha* species
pampas grass	*Cordaderia selloana*
spikeweed *	*Hemizonia pungens*
spiny cocklebur *	*Xanthium spinosum*
Swainsonpea *	*Sphaerophysa salsula*
thistle, Canada *	*Cirsium arvense*
yellow flag iris *	*Iris pseudacorus*
yellow toadflax	*Linaria vulgaris*
Klickitat County Weeds of Local Concern	
common St. Johnswort *	*Hypericum perforatum*
jointed goatgrass *	*Aegilops cylindrica*
wild carrot *	*Daucus carota*

Source: Klickitat County 2017

* indicates known population in Klickitat County.
Class A: The State of Washington through Revised Code of Washington (RCW) 17.10 has listed the following Class A weeds for eradication statewide. Class A consists of those noxious weeds not native to state that are of limited distribution or are unrecorded in the state and that pose a serious threat to the state. (RCW 17.10.010.2.(a))
Class B-Designate: The State of Washington through RCW 17.10 has listed the following Class B weeds as designated for control in Klickitat County. Class B consists of those noxious weeds not native to the state that are of limited distribution or are unrecorded in a region of the state and that pose a serious threat to that region. (RCW 17.10.010.2(b))
Class B: The Klickitat County Noxious Weed Control Board through RCW 17.10 has listed the following Class B weeds, not designated by the State, to be on the county noxious weed list. Class B consists of those noxious weeds not native to the state that are of limited distribution or are unrecorded in a region of the state and that pose a serious threat to that region. (RCW 17.10.010.2(b))
Class C: The Klickitat County Noxious Weed Control Board through RCW 17.10 has listed the following Class C weeds to be designated for control on the county noxious weed list. Class C consists of any other noxious weeds. (RCW 17.10.010.2(c))
Weeds of Local Concern: These are additional non-native, invasive plant species that are of concern in Klickitat County. The Board encourages and recommends control and containment of existing populations, but control is not required.

Table 3.3-2: 2018 Sherman County Noxious Weeds List

Common Name	Scientific Name
"A" Class – High Priority	
Canada thistle	*Cirsium arvense*
Houndstongue	*Cynoglossum officinale*
Jimsonweed	*Datura stramonium*
Kochia	*Kochia scoparia*
Leafy spurge	*Euphorbia esula*
Knapweed complex	*Centaurea sp.*
Rush skeletonweed	*Chondrilla juncea*
Spikeweed	*Hemizonia pungens*
Yellow starthistle	*Centaurea solstitialis*
"B" Class – Moderate Priority	
Canada thistle	*Cirsium arvense*
Dalmation toadflax	*Linaria dalmatica*
Field bindweed	*Convolvulus arvensis*
Knapweed complex	*Centaurea sp.*
Perennial sowthistle	*Sonchus arvensis*
Scotch thistle	*Onopordum acanthium*
Scouring rush	*Equisetum laevigatum*
Showy milkweed	*Asclepias speciosa*
Whitetop (hoary cress)	*Cardaria draba*
Wild oats	*Avena fatua*
Yellow starthisle	*Centaurea solstitialis*
"C" Class – Low Priority	
Bull Thistle	*Cirsium vulgare*
Common Rye	*Secale cereale*
Field Dodder	*Cuscuta campestris*

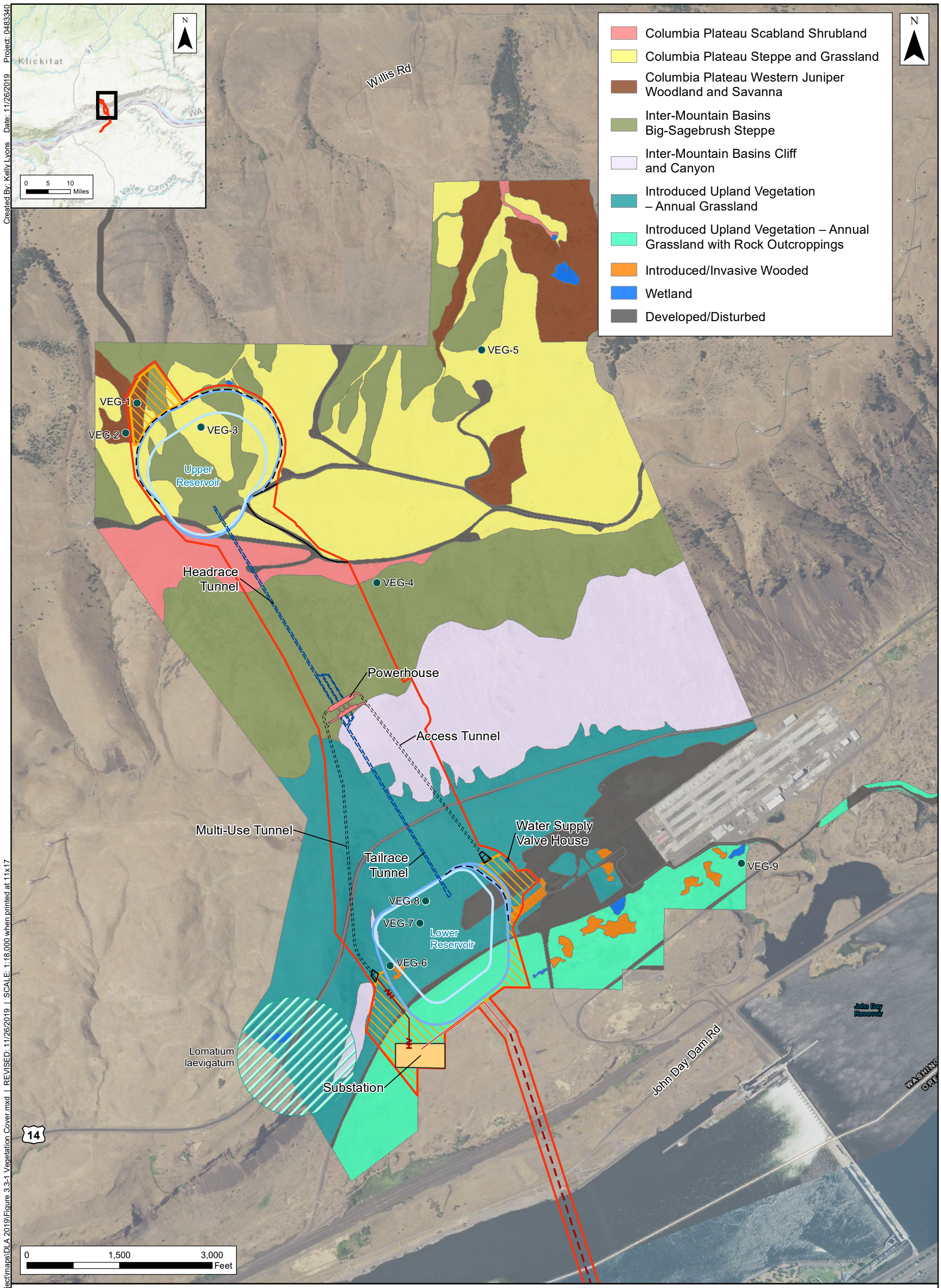
Common Name	Scientific Name
Jointed Goatgrass	*Aegilops cylindrical*
Klamath Weed (St. Johnswort)	*Hypericum perforatum*
Little Bur (Bur Buttercup)	*Ranunculus testiculatus*
Marestail	*Contza canadensis*
Medusahead Rye	*Taeniatherum caput-medusae*
Perennial pepperweed	*Lepidium latifolium*
Poison hemlock	*Conium maculatum*
Prickly lettuce	*Lactuca serriola*
Puncturevine	*Tribulus terrestris*
Quackgrass	*Elymus repens*
Russian thistle	*Salsola iberica*
Spiney cocklebur	*Xanthium spinosum*
Western water hemlock	*Cicuta douglasii*
Wavyleaf thistle	*Cirsium undulatum*
"Q" Class – Questionable List	
Hairy willow-herb	*Epilobium hirsutum*
"T" Class – Targeted List	
Canada thistle	*Cirsium arvense*
Dalmation toadflax	*Linaria dalmatica*
Jimsonweed	*Datura stramonium*
Knapweed complex	*Centaurea sp.*
Kochia	*Kochia scoparia*
Leafy spurge	*Euphorbia esula*
Rush skeletonweed	*Chondrilla juncea*
Scotch thistle	*Onopordum acanthium*
Spikeweed	*Hemizonia pungens*
Whitetop (hoary cress)	*Cardaria draba*
Yellow starthisle	*Centaurea solstitialis*
"W" Class – Watch List	
Blessed Milkthistle	*Silybum marianum*
Camelthorn	*Alhagi pseudalhagi*
Common Crupina	*Crupina vulgaris*
Gorse	*Ulex europaeus*
Halogeton	*Halogeton glomeratus*
Iberian Starthistle	*Centaurea iberica*
Italian Thistle	*Carduus pycnocephalus*
Mediterranean sage	*Salvia aethiopis*
Musk Thistle	*Carduus nutans*
Scotch Broom	*Cytisus scoparius*
Tansy Ragwort	*Senecio jacobaea*
Wild – Prosso Millet	*Panicum miliaceum*

Source: Sherman County 2017

"A" Class – High Priority. Any noxious weed that greatly endangers the overall economic well-being of the county and has a small enough distribution where eradication is possible.
"B" Class – Moderate Priority. A noxious weed that is well established in the county and has known negative impacts, but due to its distribution, eradication is not feasible.
"C" Class – Low Priority. A noxious weed that is wide-spread throughout the county and has known economic impacts.
"Q" Class - Questionable List. A newly detected weed that may have some importance, but more information is needed to determine its impact on agriculture.
"T" Class - Targeted List. A noxious weed from any Class that the Weed Advisory Board wishes to focus efforts and resources. This List will be reviewed annually.
"W" Class - Watch List. Any noxious weed that may occur in neighboring counties, the state, or similar environments as the county, and could potentially endanger the overall economic well-being of the county. Once detected, these weeds shall be moved to the appropriate List.

3.3.1.2 Vegetation Types

Field data collected during the 2015 survey was used to classify vegetation in the study area using classes established by the Washington Natural Heritage Program (WNHP) Field Guide to Washington's Ecological Systems (referred to as the WNHP Classification; WNHP 2015). The Ecological Systems units were developed by NatureServe to provide temporal and spatial scale landscape data for use in ecological mapping, and conservation and biological assessments. Vegetation types were mapped in GIS using aerial imagery, and 2015 observation points are presented in Figure 3.3-1.



Legend

- 2015 Observation Point
- Rare & Imperiled Species and Plant Communities (WNHP)
- Project Boundary

Proposed Infrastructure

- Access Road
- High Voltage Cable
- Transmission Line
- Transmission Co-Located with Existing BPA ROW
- Existing Access Road
- Proposed Reservoir
- Proposed Reservoir Berm Outer Slope
- Laydown Area
- Powerhouse
- Substation
- Water Supply Valve House
- Access Tunnel
- Access Tunnel Portal
- Headrace/Tailrace Tunnel

Figure 3.3-1
Vegetation Cover Types
Draft License Application
Goldendale Energy Storage Project
Goldendale, WA

Environmental Resources Management
www.erm.com

Source: National Agricultural Imagery Program, July 2017, flown 1m per pixel; NAD 1983 StatePlane Washington South FIPS 4602 Feet

Created By: Kelly Lyons | Date: 11/26/2019 | Project: 0483340

FILE: M:\Projects\Goldendale Energy Storage Project\maps\DLA 2019\Figure 3.3-1 Vegetation Cover.mxd | REVISED: 11/26/2019 | SCALE: 1:18,000 when printed at 11x17

The following sections provide brief descriptions of vegetation types mapped during the 2015 field study. In summary, the upper reservoir area consists of a mix of grassland and shrub habitat (much of which is currently or historically grazed), with some juniper woodlands in the draws. The middle of the Project area is characterized by sagebrush steppe and cliff habitat, while the lower reservoir area is primarily developed or disturbed grassland. Three areas of oak woodlands are mapped in the PHS Mapper (WDFW 2018b) within the Project Boundary in the upper and lower reservoir areas and the middle escarpment, but these areas were confirmed to not be oak woodlands during the 2015 and 2019 field surveys. Stands of Ponderosa pine and western juniper were observed within the three mapped PHS boundaries. No Oregon white oak was observed within the Project area.

Columbia Plateau Steppe and Grassland

CPSG cover type is found exclusively in the upper portion of the study area. It is dominated by perennial bunchgrasses and forbs, with a sparse shrub layer. According to the WNHP classification, forbs typically average 25 percent cover, and shrubs average approximately 10 percent cover. Soils vary from deep and well-drained to shallow with a microphytic crust. The land cover type supports a variety of grasses and forbs, while disturbed stands may contain rabbitbrush, sagebrush, and other disturbance-tolerant shrubs (WNHP 2015).

ERM established two sampling plots (VEG-3 and VEG-5) within the CPSG land cover type. This land cover type forms a mosaic with the Columbia Plateau Scabland Shrubland (CPSS), but mosaic features are small within the larger cover CPSG cover type and are being referred to as CPSG. The herb layer consisted of Hood River milk-vetch (*Astragalus hoodianus*), nine-leaf biscuitroot (*Lomatium triturnatum*), spiny phlox (*Phlox hoodii*), curly blue grass (*Poa secunda*), Idaho fescue (*Festuca idahoensis*), bulbous blue grass (*Poa bulbosa*), spring draba (*Draba verna*), springbeauty (*Claytonia* sp.), and bluebunch wheatgrass (*Pseudoroegneria spicata*). The shrub layer consisted of woody buckwheat species (*Eriogonum* spp.), rose (*Rosa* spp.), and rubber rabbitbrush (*Ericameria nauseosa*). Graminoids made up 60 to 80 percent of overall absolute cover, shrubs contributed to approximately 10 to 15 percent, and forbs contributed 25 to 30 percent cover.

Inter-Mountain Basins Cliff and Canyon

Inter-Mountain Basins Cliff and Canyon (IMBCC) cover type occurs as a band along the cliff faces across the center of the study area. ERM verified the IMBCC land cover type through visual assessment from above and below the cliffs, as all IMBCC present at the site is very steep and cannot be accessed safely. IMBCC occurs where steep cliff faces, narrow canyons, unstable scree and talus slopes, and rock outcroppings result in very sparse vegetation. Some denser vegetation areas on unstable scree and talus slopes directly below cliff faces are also included in this cover type. IMBCC supports a variety of trees, shrubs, and forbs despite the steep, unstable environment, including serviceberry (*Amelanchier alnifolia*), netleaf hackberry (*Celtis*

reticulata), smooth sumac (*Rhus glabra*), western juniper, big sagebrush (*Artemisia tridentate*), antelope bitterbrush (*Purshia tridentate*), curl-leaf mountain-mahogany (*Cercocarpus ledifolius*), and ocean-spray (*Holodiscus discolor*) (WDFW 2018a).

Inter-Mountain Basins Big Sagebrush Steppe

IMBBSS cover type is found in the upper portion and across the steep middle of the study area. According to the WNHP classification, IMBBSS is grassland with an open to moderately dense shrub cover, varying from 5 to 50 percent. One sampling plot (VEG-4) was established within the IMBBSS cover type (Figure 3.3-1). The plot was established on a steep slope to the south of the upper reservoir site. The herb layer consisted of arrow-leaf balsamroot (*Balsamorhiza sagittata*), bluebunch wheatgrass, lupine species (*Lupinus* spp.), fern-leaf biscuitroot (*Lomatium dissectum*), bulbous blue grass, and brome species (*Bromus* spp.). The shrub layer was made up of rubber rabbitbrush, buckwheat species, and stiff sagebrush (*Artemisia rigida*). Graminoids made up approximately 80 percent of absolute cover, shrubs consisted of approximately 20 percent, and forbs contributed to 15 percent. Exposed rock and dirt was present at approximately 30 percent.

Columbia Plateau Scabland Shrubland

CPSS is found as a band just above the cliffs across the central portion of the Project Boundary. According to the WNHP classification, CPSS consists of low, xeric shrubs and grasses on sites with little soil development and extensive exposed rock, gravel, or compacted soils. The CPSS cover type forms a matrix or mosaic with CPSG. Total vegetation cover is typically less than 50 percent. The shrub layer is comprised of stiff sagebrush and shrubby buckwheat species, with scattered forb species in the genuses *Allium*, *Balsamorhiza*, *Lomatium*, *Phlox*, and *Sedum*. Undisturbed areas within this cover type may have up to 60 percent moss and lichen cover (Rocchio and Crawford 2009). ERM confirmed the CPSS cover type near the southern edge of the upper reservoir. Plant genuses observed included *Sedum*, *Phlox*, and *Eriogonum*, with a high percentage of rock and lichen.

Columbia Plateau Western Juniper Woodland and Savanna

Columbia Plateau Western Juniper Woodland and Savanna cover type is found in draws in the upper portion of the study area. According to the WNHP classification, this cover type is comprised of short trees which persist in basins, canyons, slopes, and valley margins. Western juniper is often the only tree species, though they may be interspersed with Ponderosa pine.

Two quadrat-sampling plots were established in this cover type (VEG-1 and VEG-2). The herb layer included nine-leaf biscuitroot, Hood River milk-vetch, brome species, bulbous blue grass, curly blue grass, yellow rabbitbrush (*Chrysothamnus viscidiflorus*), yarrow (*Achillea* spp.), and sunflower (*Eriophyllum* spp.). The shrub layer consisted of rubber rabbitbrush and woody buckwheat species, with ponderosa pine and western juniper trees. Graminoids contributed 50 to

80 percent of absolute cover, the herb layer contributed 10 to 15 percent, and shrubs contributed approximately 35 to 60 percent cover. Trees comprise approximately 20 to 25 percent cover within the total polygon, with trees becoming scarcer on the slopes and denser in the valleys and draws. Ponderosa pine comprised approximately 80 percent of total tree cover on the slopes, with western juniper making up the remaining 20 percent.

Introduced Upland Vegetation—Annual Grassland

IUVAG cover type was found exclusively in the lower portion of the study area where impacts have been high due to industrial activity and other development. The area shows evidence that it was formerly CPSG, which has been invaded by cheatgrass and other non-native or invasive species. Rubber rabbitbrush is present in large areas, and other native shrubs and forbs are present throughout this cover type.

Three quadrat-sampling locations were established within the IUVAG cover type (VEG-6, VEG-7, and VEG-8). The herb layer primarily consisted of cheatgrass, needle-and-thread grass (*Hesperostipa comata*), bulbous blue grass, buckwheat species, Menzies' fiddleneck (*Amsinckia menziesii*), fern-leaf biscuitroot, and groundsel (*Senecio* sp.). The shrub layer consisted primarily of rubber rabbitbrush, with some woody buckwheat species, both in varying densities throughout the cover type. The grassland areas closer to the bluffs at the lower site contained up to 20 percent talus rocks within the meadow. Over all quadrat locations, graminoids contributed 70 to 90 percent absolute cover, herbaceous species contributed approximately 5 to 10 percent, and shrubs contributed approximately 5 to 30 percent.

Introduced/Invasive Wooded

Introduced/Invasive Wooded cover type is found exclusively as patches within in the disturbed and developed lower portion of the study area. The trees include Russian olive, ornamental pea-family trees, black cottonwood (Populus trichocarpa), smooth sumac, and scattered sweet almond (*Prunus dulcis*) and netleaf hackberry trees. Black cottonwood, netleaf hackberry, and smooth sumac are native, but are assumed to be planted given the development of the area.

Introduced Upland Vegetation—Annual Grassland with Rock Outcroppings

The Introduced Upland Vegetation—Annual Grassland with Rock Outcroppings (IUVAGRO) cover type is found in a band along the southern portion of the study area. This cover type is similar to IUVAG, but closer to the Columbia River and with prominent rock outcroppings throughout. Rabbitbrush is still present, but not as prevalent as in IUVAG.

One quadrat-sampling location was established to represent the IUVAGRO cover type (VEG-9). The herbaceous layer consisted of cheatgrass, yarrow, brome species, and quackgrass (*Elymus repens*). A woody buckwheat species was present in the shrub layer. Other species observed in the vicinity were fern-leaf bicuitroot, Menzies' fiddleneck, rubber rabbitbrush, and Canada

thistle (*Cirsium arvense*). Graminoids contributed to approximately 75 percent of absolute cover, forbs to approximately 10 percent, and shrubs to approximately 5 percent. Approximately 25 percent of this cover type is attributed to rock or scree.

3.3.1.3 Rare, Threatened, and Endangered Plant Species

Tables 3.3-3 and 3.3-4 present plant species of special concern with documented occurrences in Klickitat County, Washington and Sherman County, Oregon, respectively. For Washington, species ranking and status follow the 2018 Washington Vascular Plant Species of Special Concern prepared by the WNHP (WNHP 2018). For Oregon, species ranking and status follow the Rare, Threatened and Endangered Species of Oregon prepared by the Oregon Biodiversity Information Center (OBIC 2019), and the USFWS Federally Listed, Proposed, Candidate, Delisted Species and Species of Concern Under USFWS Jurisdiction which may occur in Oregon (USFWS 2018a). None of the species documented in either county are federally designated as threatened, endangered, or candidate species (WNHP 2018; OBIC 2019; USFWS 2018a).

In Klickitat County, there are 68 special status species with documented occurrences, of which 8 are listed as state endangered, 30 are listed as state threatened, and 25 are listed as state sensitive (WNHP 2018). The remaining 5 are listed as extirpated from Washington State. Known occurrences of Klickitat County special status species in the Project vicinity (from the WNHP database as of 2014) are presented in Figure 3.3-2, filed as privileged (DNR 2014a). These known occurrences are described in the next section.

In Sherman County there are 27 special status species with documented occurrences, of which one is listed as state endangered (but also considered extirpated), one is listed as state threatened, and two are listed as state candidate species (OBIC 2019). The remainder of the Sherman County species do not have a state status but are still considered special status species by the Oregon government agencies and the Oregon Biodiversity Information Center (OBIC 2019).

Table 3.3-3: Klickitat County, Washington, 2018 List of Known Occurrences of Rare Plants

Scientific Name	Common Name	State Status	State Rank
Agoseris elata	tall agoseris	S	S3?
Ammannia robusta	grand redstem	T	S1
Artemisia campestris var. *wormskioldii*	Wormskiold's northern wormwood	E	S1
Astragalus arrectus	Palouse milk-vetch	T	S2
Astragalus diaphanus	transparent milkvetch	X	SX
Astragalus misellus var. *pauper*	pauper milk-vetch	S	S2
Astragalus pulsiferae var. *suksdorfii*	Ames' milkvetch	E	S1
Bergia texana	Texas bergia	X	SX
Bolandra oregano	Oregon bolandra	T	S2
Calochortus longebarbatus var. *longebarbatus*	long-bearded sego lily	S	S3

Scientific Name	Common Name	State Status	State Rank
Cirsium remotifolium var. *remotifolium*	weak thistle	S	S1
Collinsia sparsiflora var. *bruceae*	few-flowered collinsia	T	S1
Corispermum villosum	hairy bugseed	S	S2
Cryptantha rostellata	beaked cryptantha	T	S2
Cryptantha spiculifera	Snake River cryptantha	S	S2S3
Cusickiella douglasii	Douglas' draba	T	S1
Damasonium californicum	fringed water-plantain	T	S1
Diplacus cusickioides	Cusick's monkeyflower	T	S1
Eremothera minor (Camissonia minor)	Small-flower evening-primrose	S	S2
Eryngium petiolatum	Oregon coyote-thistle	T	S2
Erythranthe jungermannioides	liverwort monkeyflower	X	SH
Erythranthe pulsiferae	Pulsifer's monkeyflower	S	S2
Erythranthe suksdorfii	Suksdorf's monkeyflower	S	S2S3
Erythranthe washingtonensis	Washington monkeyflower	X	SH
Githopsis specularioides	common bluecup	S	S2S3
Hackelia diffusa var. *diffusa*	diffuse stickseed	T	S2
Isoetes nuttallii	Nuttall's quillwort	S	S2
Juncus hemiendytus var. *hemiendytus*	dwarf rush	T	S1
Juncus kelloggii	Kellogg's rush	E	S1
Juncus uncialis	inch-high rush	T	S2
Lasthenia glaberrima	smooth goldfields	T	S1
Leptosiphon bolanderi	Baker's linanthus	S	S2
Leymus flavescens (Elymus flavescens)	yellow wildrye	S	S1
Liparis loeselii	bog twayblade	E	S1
Lipocarpha aristulata	halfchaff awned sedge	T	S1S2
Lomatium laevigatum	smooth desert-parsley	T	S2S3
Lomatium suksdorfii	Suksdorf's desert-parsley	S	S3
Lomatium tamanitchii	ribseed biscuitroot	S	S2
Meconella oregano	white meconella	E	S1
Mimetanthe pilosa	false monkeyflower	S	S1
Minuartia pusilla	annual sandwort	T	S1
Montia diffusa	branching montia	S	S2
Myosurus clavicaulis	Mousetail	T	S2
Navarretia tagetina	marigold navarretia	T	S1
Nicotiana attenuate	coyote tobacco	S	S2
Oenothera cespitosa ssp. *cespitosa*	caespitose evening-primrose	S	S2
Oenothera cespitosa ssp. *marginata*	tufted evening-primrose	T	S1
Ophioglossum pusillum	Adder's-tongue	S	S2
Orobanche californica ssp. *grayana*	California broomrape	E	S1
Orthocarpus bracteosus	rosy owl-clover	T	S2
Oxalis suksdorfii	western yellow oxalis	T	S1

Scientific Name	Common Name	State Status	State Rank
Penstemon barrettiae	Barrett's beardtongue	T	S2
Penstemon deustus var. *variabilis*	hot-rock penstemon	T	S1
Penstemon eriantherus var. *whitedii*	Fuzzy tongue penstemon	T	S2
Polygonum parryi	Parry's knotweed	T	S1
Potentilla newberryi	Newberry's cinquefoil	X	SH
Ranunculus hebecarpus	downy butter-cup	T	S1
Ranunculus triternatus	obscure buttercup	E	S1S2
Rorippa columbiae	Persistent sepal yellowcress	T	S1S2
Rotala ramosior	lowland toothcup	S	S2
Salix sessilifolia	soft-leaved willow	S	S2
Scribneria bolanderi	Scribner's grass	T	S1
Sisyrinchium sarmentosum	pale blue-eyed grass	T	S2
Spiranthes porrifolia	western ladies' tresses	S	S2
Utricularia intermedia	flat-leaved bladderwort	S	S2S3
Veratrum insolitum	Siskiyou false hellebore	E	S1
Wyethia angustifolia	California compassplant	S	S1
Zeltnera muehlenbergii	Monterey centaury	T	S1

Source: WNHP 2018; USFWS 2019d

- = No listing

State Status

State Status of plant species is determined by the WNHP. Factors considered include abundance, occurrence patterns, vulnerability, threats, existing protection, and taxonomic distinctness. Values include:

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 the state.

X = Possibly extinct or Extirpated from Washington.

R1 = Review group 1. Of potential concern but needs more field work to assign another rank.

R2 = Review group 2. Of potential concern but with unresolved taxonomic questions.

State Rank

Washington State Department of Natural Resources (DNR) WNHP uses the ranking system developed by NatureServe to assess global and state conservation status of each plant species, subspecies, and variety.

S1 = Critically Imperiled – at very high risk of extirpation due to very restricted range, very few occurrences, very steep declines, very severe threats, or other factors

S2 = Imperiled – at high risk of extirpation due to restricted range, few occurrences, steep declines, severe threats, or other factors

S3 = Vulnerable – at moderate risk of extirpation due to a fairly restricted range, relatively few occurrences, recent and widespread declines, threats, or other factors

S4 = Apparently secure – at fairly low risk of extirpation due to an extensive range or many occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors

S5 = Secure – at very low risk of extirpation due to a very extensive range, abundant occurrences, and little to no concern from decline or threats

SH = Historical– known from only historical occurrences (prior to 1978) but still with some hope of rediscovery

SX = Presumed Extirpated – not relocated since 1978 despite intensive searches and virtually no likelihood of rediscovery

U = Unrankable – lack of information or substantially conflicting information about status

NR = Not Ranked – rank not assessed yet
Q = Questionable - questions exist about the taxonomic validity of a species, subspecies, or variety
? = Questionable – questions exist about the assigned G, T, or S rank of a taxon

Table 3.3-4: Sherman County, Oregon 2016 List of Rare, Threatened, and Endangered Plant Species

Scientific Name	Common Name	State Status	State Rank	Federal Status
Abronia mellifera	White sandverbena	-	SNR	-
Achnatherum hendersonii	Henderson ricegrass	C	S2	-
Allium robinsonii	Robinson's onion	-	SX	-
Ammannia robusta	An ammannia	-	SNR	-
Artemisia campestris var. wormskioldii	Northern wormwood	E	SX	-
Astragalus collinus var. laurentii	Laurence's milk-vetch	T	S1	-
Astragalus conjunctus var. conjunctus	Idaho milk-vetch	-	SNR	-
Astragalus conjunctus var. rickardii	Rickard's milk-vetch	-	SNR	-
Astragalus reventiformis	Long-leaved milk-vetch	-	SNR	-
Astragalus sclerocarpus	Stalked-pod milk-vetch	-	SNR	-
Cryptantha rostellata	Beaked cryptantha	-	SNR	-
Elymus lanceolatus ssp. psammophilus	Sand-dune wild-rye	-	SNR	-
Eriogonum thymoides	Thyme-leaved buckwheat	-	SNR	-
Erythranthe jungermannioides	Hepatic monkeyflower	C	S3	-
Hackelia diffusa var. cottonii	Creamy stickseed	-	S3	-
Heliotropium curassavicum	Salt heliotrope	-	S2	-
Juncus mexicanus	Mexican rush	-	SNR	-
Lomatium laevigatum	Smooth desert parsley	-	S3	-
Marsilea vestita	Hairy water-fern	-	SNR	-
Navarretia leucocephala ssp. leucocephala	White-flowered navarretia	-	S4	-
Orobanche ludoviciana ssp. ludoviciana	Louisiana broomrape	-	SNR	-
Pediocactus nigrispinus	Snowball cactus	-	S4	-
Penstemon acuminatus var. acuminatus	Sand dune penstemon	-	SNR	-
Penstemon deustus var. variabilis	Hot-rock penstemon	-	S1S2	-
Physaria douglasii ssp. douglasii	Columbia bladderpod	-	SNR	-
Spartina pectinate	Prairie cordgrass	-	SNR	-
Triglochin scilloides	Flowering quillwort	-	S3?	-

Sources: OBIC 2019; USFWS 2019c

- = No listing

State Status

State status of plant species as determined by the Oregon Department of Agriculture
E = Endangered. Any native plant species determined by the director to be in danger of extinction throughout all or any significant portion of its range; or any plant species listed as an endangered species pursuant to the federal Endangered Species Act of 1973.
T = Threatened. Any native plant species the director determines is likely to become endangered within the foreseeable future throughout all or any significant portion of its range; or any plant species listed as a threatened species pursuant to the federal Endangered Species Act of 1973.

C= Candidate. Any plant species designated for study by the director whose numbers are believed low or declining, or whose habitat is sufficiently threatened and declining in quantity and quality, so as to potentially qualify for listing as a threatened or endangered species in the foreseeable future

State Rank

The most widely used NatureServe rank in the United States are the State Ranks, which describe the rarity of a species within each state's boundary.

S1 = Critically imperiled because of extreme rarity or because it is somehow especially vulnerable to extinction or extirpation, typically with 5 or fewer occurrences.

S2 = Imperiled because of rarity or because other factors demonstrably make it very vulnerable to extinction (extirpation), typically with 6-20 occurrences.

S3 = Rare, uncommon or threatened, but not immediately imperiled, typically with 21-100 occurrences.

S4 = Not rare and apparently secure, but with cause for long-term concern, usually with more than 100 occurrences.

S5 = Demonstrably widespread, abundant, and secure.

SH = Historical Occurrence, formerly part of the native biota with the implied expectation that it may be rediscovered.

SX = Presumed extirpated or extinct.

SU = Unknown rank.

SNR = Not yet ranked or assigned rank is uncertain.

Special Status Species within the Project Vicinity

The Applicant performed an analysis of suitable habitat and known occurrences for the Klickitat County species listed in Table 3.3-5 and determined that 14 of the Klickitat County species have the potential to occur in the Project vicinity. Suitable habitat in Sherman County was not assessed during the 2015 or 2019 vegetation studies, but it could be assessed as needed for the transmission portion of the Project.

Table 3.3-5 provides details on the 14 state-listed endangered, threatened, and sensitive species with the potential to occur in the vicinity of the study area (no federally listed species have potential to occur). Of these, Wormskiold's northern wormwood (*Artemisia campestris* var. *wormskioldii*), California broomrape (*Orobanche californica* ssp. *grayana*), and obscure buttercup (*Ranunculus triternatus*) are listed as state endangered; few-flowered collinsia (*Collinsia sparsiflora* var. *bruceae*), inch-high rush (*Juncus uncialis*), Douglas' draba (*Cusickiella douglasii*), smooth desert-parsley (*Lomatium laevigatum*), smooth goldfields (*Lasthenia glaberrima*), and hot-rock penstemon (*Penstemon deustus* var. *variabilis*) are listed as state threatened; and common bluecup (*Githopsis specularioides*), Baker's linanthus (*Leptosiphon bolanderi*), Nuttall's quillwort (*Isoetes nuttallii*), and western ladies' tresses (*Spiranthes porrifolia*) are listed as state sensitive.

Within 3 miles of the potential Project study area, the WNHP has recorded two occurrences of smooth desert-parsley, as shown on Figure 3.3-2, filed as privileged. The plants are located on steep, rocky talus slopes to the west of the study area and are unlikely to be impacted by potential Project activities. ERM confirmed the presence of smooth desert-parsley (outside of the Project area) during the 2015 area visit but none was observed within the Project area in 2019 surveys, as described below.

Table 3.3-5: Klickitat County Sensitive Plant Species Potentially Occurring within the Project Vicinity

Common Name	Scientific Name	State Status	Habitat Requirements
Baker's linanthus	*Leptosiphon bolanderi*	Sensitive	Dry, rocky, partially vegetated slopes, scattered basalt rocks, bare mineral soil; elevations 260-550 meters; associated with Oregon white oak (DNR 2014b).
California broomrape	*Orobanche californica* ssp. *grayana*	Endangered	Vernally moist meadows and lower montane meadows, parasitic on sagebrush, elevations sea level to 450 meters (DNR 2014b).
Common bluecup	*Githopsis specularioides*	Sensitive	Dry open thin soils over bedrock outcrops, grassy balds, talus slopes, and gravelly prairies at low elevations; adjacent to forest; can be associated with Oregon white oak (WNDR 2014).
Douglas' draba	*Cusickiella douglasii*	Threatened	Open rocky ridges on thin, sandy to gravelly soil over basalt, elevations 790-860 meters (DNR 2014b).
Few-flowered collinsia	*Collinsia sparsiflora* var. *bruceae*	Threatened	Thin soils over basalt on south-facing slopes; moist in spring, dry in summer; elevations 60–730 meters (DNR 2014b).
Hot-rock penstemon	*Penstemon deustus* var. *variabilis*	Threatened	Dry foothills and lowlands, open dry thin soils over basalt, elevations 500–1000 meters (DNR 2014b).
Inch-high rush	*Juncus uncialis*	Threatened	Vernal pools and pond edges, channeled scablands, and biscuit-swale topography; elevations 90–760 meters (DNR 2014b).
Nuttall's quillwort	*Isoetes nuttallii*	Sensitive	Seasonally wet ground, seepages, temporary streams, mud near vernal pools; elevations 60–405 meters (DNR 2014b).
Obscure buttercup	*Ranunculus triternatus*	Endangered	Meadow steppe, north-facing slopes, and basalt ridges in loess deposited soil; elevations 580–1220 meters (DNR 2014b).
Smooth goldfields	*Lasthenia glaberrima*	Threatened	Vernal ponds on basalt tablelands where the area is wet in winter and dry by late spring (DNR 2014b).
Smooth desert-parsley	*Lomatium laevigatum*	Threatened	Ledges and crevices of basalt cliffs on Columbia River, adjacent rocky slopes of sagebrush steppe; elevations 50–300 meters (DNR 2014b).
Suksdorf's desert-parsley	*Lomatium suksdorfii*	Sensitive	Open dry rocky hillsides on slopes; elevation 90–1100 meters; associated with Oregon white oak (DNR 2014b).
Western ladies' tresses	*Spiranthes porrifolia*	Sensitive	Wet meadows, bogs, streams, and seepage slopes; elevations 3–2075 meters (DNR 2014b).
Wormskiold's northern wormwood	*Artemisia campestris* var. *wormskioldii*	Endangered	Arid shrub steppe on basalt, usually flat terrain, floodplain of Columbia River (DNR 2014b).

Source: WNHP 2018

Note:
-- = not listed

Figure 3.3-2: Rare Plant Populations (DNR 2014a), Filed as Privileged Information

Rare, Threatened, and Endangered Plant Species Survey

On May 14 and 15, 2019, ERM performed a botanical survey for the 14 state-listed endangered, threatened, and sensitive species with potential to occur within the Project area. Based on known primary constituent elements of suitable habitat for these species, portions of both the upper and lower reservoir areas and connecting escarpment were found to contain habitat suitable for 9 of the 14 rare plant species surveyed. This habitat can be separated into five distinct rare plant habitat (RPH) classes relative to the Project area (see Figure 2.1-1 of the Botanical Report, Appendix C). No individuals from the 14 target species or other sensitive plant species were observed in the study area.

RPH-1 is characterized by seeps and ephemeral streams located in both the upper and lower portions of the study area, mapped by ERM in May 2019. RPH-1 in the upper reservoir area was found to be suitable for California broomrape. The remainder of RPH-1 is located to the south near State Route 14 and is characterized by seeps and streams whose moisture regimes may be sufficient to support Nuttall's quillwort and smooth goldfields, but are unlikely to support these species due to the dominance of upland vegetation. RPH-2 occurs along the steep south-facing talus slopes, which span the center of the study area and was determined to be suitable for smooth desert parsley. RPH-3 is found as a band of Columbia Plateau scabland-shrubland located at the top of the escarpment along the southern edge of the upper reservoir area, and contains suitable habitat for smooth desert parsley, Douglas' draba, and hot-rock penstemon. RPH-4 is found across the steep south-facing rocky slope just below RPH-3 and just above RPH-2 and contains suitable habitat for few-flowered collinsia, common bluecup, and smooth desert parsley. RPH-5 is a wetland area associated with a seep just above State Route 14, which contains both flowing and standing water. RPH-5 conditions are suitable for western ladies tresses, Nuttall's quillwort, and smooth goldfields.

Based on observations described above from botanical surveys conducted in April 2015 and May 2019, no rare plant species are present within the Project area, but suitable habitat exists for California broomrape, common bluecup, Douglas' draba, few-flowered collinsia, hot-rock penstemon, Nuttall's quillwort, smooth goldfields, smooth desert parsley, and western ladies' tresses. Due to the existing level of disturbance and presence of invasive plant species and Klickitat County designated noxious weeds, much of the study area was determined to be low-quality habitat and is therefore unlikely to support the species surveyed.

3.3.1.4 Culturally Important Species

The Cultural Resources Survey Report (Report) for the Project (Shellenberger 2019 and Appendix H, filed as priviledged) includes the results of an ethnobotanical survey conducted by the Yakama Nation Wildlife, Range, and Vegetation Resources Management Program. The ethnobotanical survey was conducted within the cultural resources area of potential effect (APE; which is simultaneous with the Project Boundary) as part of the investigation of the Traditional

Cultural Property (TCP) that was identified within the APE. Table 3 in the Report presents the species documented in the survey, and is presented as Table 3.3-6 below. No date for the plant survey was provided, and it is unclear whether the plant survey took place simultaneous to the archaeological surveys which occurred in late July 2019 (Shellenberger 2019).

The 2019 rare plant survey conducted by the Applicant did not find smooth desert-parsley in the Project Boundary, yet the Yakama ethnobotanical survey documented smooth desert-parsley in the cultural resources APE, and thus within the Project Boundary (Table 3.3-6). No location data for the species was provided in the Report. Therefore, the Applicant will pursue further communication with the Yakama Nation Wildlife, Range, and Vegetation Resources Management Program to confirm where this species was documented within the Project Boundary. Smooth desert-parsley is the only rare species in Table 3.3-6.

The Cultural Resources Survey Report does not describe the cultural significance of individual species identified in Table 3.3-6. Rather, it states that the "…foods and medicines present within the TCP are contributing elements to its significance under Criteria A and B," with "Criteria A and B" refering to National Register of Historic Places Evaluation Criteria. The Report does not make exlicit whether all of the species in Table 3.3-6 were considered "food and medicine". However, it describes Juniper Point as "an important place for gathering roods [sic] and medicines," and presents an argument based on traditional cultural significance as to how the plants present at Juniper Point contribute to evaluation Criteria A and B. Therefore, it is assumed that the Report is implying that all of the plants founds at Juniper Point are collectively culturally significant due to their use as Yakama traditional foods and medicines historically collected at in the Project vicinity. This assumption will also be clarified with the Yakama Tribe.

Table 3.3-6: Table 3 of the Cultural Resource Survey Report (Shellenberger 2019) Titled "Species Present at Juniper Point within the Goldendale Energy Project APE

Scientific Name	Common Name
Achillea millefolium	Yarrow
Allium acuminatum	Tapertip onion
Lomatium laevigatum	Smooth desert-parsley (State-Threatened Species)
Lomatium nudicaule	Barestem biscuitroot
Lomatium triturnatum	Nine-leaf biscuitroot
Lomatium papilioniferum (L. grayi)	Pungent desert parsley
Lomatium macrocarpum	Buiscuit root
Lomatium dissectum	Fernleaf buiscuitroot
Balsamorhiza sagittata	Arrowleaf balsamroot
Crataegus spp. *(C. suksdorfii or C. douglasii)*	Black Hawthorne
Rhus glabra	Smooth sumac
Juniperus occidentalis	Western juniper
Pinus ponderosa	Ponderosa pine
Eriogonum strictum var. proliferun	Strict buckwheat

Scientific Name	Common Name
Eriogonum thymoides	Thyme-leaved buckwheat
Erogonum compositum	Arrowleaf buckwheat
Lupinus latifolius	Columbia Gorge broad-leaf lupine
Ericameria nauseosa	Rubber rabbitbrush
Fritillaria camschatcensis	Chocolate lily
Rosa nutkana	Nootka rose
Triteleia hyacinthina	Brodiaea
Cirsium undulatum	Wavyleaf thistle
Crepis atribarba	Slender hawksbeard
Wyethia amplexicailis	Northern mule-ears
Lewisia rediviva	Bitterroot
Erodium cicutarium	Common stork's-bill
Claytonia perfoliata	Miner's lettuce
Apocynum androsaemifolium	Spreading dogbane
Uropappus lindleyi	Silver puffs
Amsinckia menziesii	Menzies' fiddleneck
Celtis laevigata	Netleaf hackberry
Delphinium nuttallianum	Nuttal's larkspur
Amelanchier alnifolia	Western serviceberry

3.3.2 Potential Resource Impacts

Permanent and temporary impacts on the landscape based on the proposed Project design are outlined in Table 3.3-7.

Table 3.3-7: Temporary and Permanent Impacts on Vegetation Type from Proposed Project Infrastructure

Vegetation Type[a]	Temporary Impacts (acres)	Permanent Impacts (acres)
Columbia Plateau Scabland Shrubland (CPSS)	0	0
Columbia Plateau Steppe and Grassland (CPSG)	7.5	20.8
Columbia Plateau Western Juniper Woodland and Savanna (CPWJWS)	0.8	0.0
Inter-Mountain Basins Big-Sagebrush Steppe (IMBBSS)	8.1	24.1
Inter-Mountain Basins Cliff and Canyon (IMBCC)	0.1	0.0
Introduced Upland Vegetation & Annual Grassland (IUVAG)	10.6	35.9
Introduced Upland Vegetation & Annual Grassland w/Rock Outcroppings (IUVAGRO)	26.5	0.0
Introduced/Invasive Wooded	0	0.4
Developed/Disturbed	0.8	9.3

[a] Vegetation types mapped based on 2015 field survey and classified using WNHP (2015) classifications

3.3.2.1 Rare, Threatened, and Endangered Plant Species

No impacts are expected to rare, threatened, or endangered plant species because none of these special status species are known to occur within the Project footprint, per the 2019 Botanical Resources Report (Appendix C). However, suitable habitat is present for several special status species, and if any are encountered in a pre-construction survey, they will be avoided and protected to the greatest extent practicable. The Applicant will work closely with state and federal resource agencies to ensure that operation of the facility is also in accordance with these objectives. The Vegetation Management and Monitoring Plan (VMMP) is included as Appendix E, which will guide vegetation and sensitive species protection efforts. Mitigation measures and BMPs for protection of vegetation and sensitive species are summarized in Section 3.3.3 below.

3.3.3 Applicant Recommendations

To reduce impacts to botanical resources, the Applicant proposes to implement the following PM&E measures:

- Prior to Project construction, the Applicant will conduct a formal invasive plant survey to establish baseline environmental conditions. The survey will develop a list of target invasive species to be surveyed, and identify the location and extent of any target species. This information will be used to aid in the development of a comprehensive plan to control the spread of invasive plants within the Project Boundary and that will maximize the effectiveness of restoration efforts following ground disturbance. The survey will be more fully described in the VMMP (Appendix E) as it is further developed.
- Prior to construction, the Applicant will survey any sensitive plants within areas to be disturbed and either prevent or mitigate adverse effects on these species.
- Construction and operations activities will be planned and implemented to avoid disturbance to existing native and/or sensitive plant communities and prevent the spread of noxious weeds as described in the VMMP.
- All temporarily disturbed areas will be revegetated as outlined in the VMMP.
- Once operational, the proposed Project facilities will be operated in a manner that reduces disturbance to plant communities.

PM&E measures proposed for wildlife habitat and botanical resources will also support protection and enhancement of special status species; however, there are no known special status plants within the Project footprint. These PM&E measures are further discussed in the draft VMMP (Appendix E) and WMP (Appendix D) and will be further developed in consultation with resource agencies during development of the license application.

4.0 HISTORICAL AND ARCHAEOLOGICAL RESOURCES/CULTURAL AND TRIBAL RESOURCES

This section provides a summary of known archaeological resources within the Project vicinity, as well as a description of tribes, tribal lands, and tribal interests.

The term "cultural resources" when used in this document is intended to collectively include archaeological sites and objects, historic architectural resources, and traditional cultural properties (TCPs) that are or could be within the APE (eligible, non-eligible, and unevaluated resources) consistent with National Historic Preservation Act Section 106 requirements. Examples of these resources include prehistoric and historic archaeological sites, Indian religious sites, and historical structures or buildings. Because there are no existing structures within the Project Boundary or proposed APE, the term "cultural resources" is intended to encompass archaeological resources and TCPs rather than "built" or architectural resources.

The final APE will be determined pursuant to consultation between the Applicant, the appropriate State Historic Preservation Office (SHPO), and consulting Indian tribes. The proposed Project Boundary is depicted in Exhibit G. Unless otherwise modified during consultation with tribes and other stakeholders, this area is anticipated to become the Project APE. The proposed Project Boundary encompasses approximately 652 acres of private lands owned by NSC Smelter, LLC. The only public lands within the Project Boundary are associated with the BPA transmission right-of-way. The APE may be refined based on consultation with the SHPO, tribes, and other interested parties.

A draft Historic Properties Management Plan (HPMP) is included in Appendix G, which provides more detail about the cultural resources within the proposed APE and surrounding area. The HPMP includes a review of currently available resources documentation to help identify known cultural resources, and provides guidance and procedures for considering and managing potential effects that may result from activities associated with the construction, operation, and maintenance of the Project. The HPMP also includes an Unanticipated Discovery Plan in the event that previously unknown cultural resources are discovered during Project activities. This Draft HPMP will continue to be developed and refined as the Project progresses through the FERC licensing process in consultation with FERC, the SHPOs, and tribes.

4.1 Existing Environment

The Project is not expected to affect Tribal reservation lands; however, the vicinity of the proposed Project has been identified as having been associated with use by several Indian tribes. According to the U.S. Department of the Interior, National Park Service (NPS), and Bureau of Indian Affairs, the following tribes are associated with the region surrounding the Project (NPS 2014b):

- Confederated Tribes and Bands of the Yakama Nation, Washington;

- Confederated Tribes of the Colville Reservation, Washington;
- Confederated Tribes of the Warm Springs Reservation of Oregon; and
- Confederated Tribes of the Umatilla Indian Reservation.

The Applicant conducted a review of pertinent literature in order to establish the ethnographic, archaeological, environmental, and land use history of the Project vicinity. The goal of these investigations was not only to gather an appropriate prehistoric land use history, but also to determine whether any historic land use resulted in alterations to the landscape that may have affected the integrity of archaeological resources and TCPs present. The SHPOs maintain a list of previous cultural resources studies and inventories and previously recorded cultural resource properties for Washington State and Oregon. Because the Project footprint in Oregon will be restricted to existing BPA transmission lines (aerial only) and the John Day Substation for which no new groundbreaking activities will occur, the analysis presented in this section focuses primarily on Washington State. Pertinent forms and reports available through the DAHP geographic information system (GIS) database were reviewed including topographic maps, soil surveys, aerial photographs, historical maps, and other resources to obtain historical information about the Project Boundary and vicinity and its potential to contain cultural resources.

Several studies and inventories have been completed in and around the Project area, as described briefly below, and in more detail in the draft HPMP (Appendix G). These surveys have identified various sites in and around the Project area. In addition, a comprehensive cultural resources survey was performed by the Yakama Tribe Cultural Resources Program in 2019. The existing documentation suggests that the area includes sensitive archaeological resources and TCPs. A copy of the tribe's report is included in Appendix H (filed under Privileged Information).

Cultural resource surveys typically have been conducted in response to particular federal- or state-permitted projects, or on lands managed by federal agencies. Thus, many areas may have never been systematically surveyed for the presence of cultural resources. As a consequence, the spatial patterns of cultural resource properties are often more reflective of the locations of permitted projects than locations where cultural resources properties are likely to occur.

The Columbia River has been the dominant natural feature affecting the social and cultural patterns of the region encompassing the proposed Project Boundary and has been the subject of archaeological investigations since the 1920s. Early archaeological excavations conducted along the Columbia River have shown human occupation of the area to span at least the last 10,000 years. The general area in and around the Project Boundary has been occupied by prehistoric, historic, and current Indian groups, historic Euroamerican period settlements, and recent historic and modern populations. More detailed cultural context information is provided in the Draft HPMP as well as in the Yakama Tribe Survey Report (Appendix H).

4.1.1 Previous Archaeological Resources Studies

Cultural resources surveys conducted in Washington have been conducted in the region since the early 1900s. Although this early work was important to the understanding of the cultural context of the region, early identification of undisturbed archaeological sites, and the development of archaeological method, the surveys generally lacked the systematic nature of modern survey techniques and common reporting standards. Some of these earlier cultural resources surveys were noted on DAHP site forms, but the survey reports were not available in the DAHP survey database. These surveys remain valuable for the identification of potential cultural resources within the Project area.

Beginning in the 1990s, relevant surveys within the vicinity of the Project consisted of federal and state compliance surveys and testing. As presented in Table 4.1-1, these surveys largely pertain to pipeline, electrical transmission, hydroelectric, wind energy, and telecommunications projects.

Table 4.1-1: Archaeological Surveys Conducted within 1 Mile of the Proposed Project APE

DAHP Inventory No.	Project	Year	Entity	Description
1341648	CARES Columbia Wind Farm #1	1994	Eastern Washington University	800 acres of pedestrian survey and limited subsurface excavation; 86 cultural resources identified
1340444	Northwest Pipeline Corporation's Columbia Meter Station	2001	AINW	0.2 acre of subsurface excavation; no cultural resources identified
1341471/1341473/1341481	GNA Energy LLC's Cliffs Energy Natural Gas Pipeline	2001	Applied Archaeological Research	Subsurface excavation at sites 45KL0466, 45KL0467, and 45KL0775
1341470	Calpine Energy Company's Goldendale Energy Plant	2002	URS	Subsurface excavation at site 45KL0746
1686109	U.S. Army Corps of Engineers' John Day Reservoir Project	2004/2005	Confederated Tribes of the Umatilla Indian Reservation Cultural Resources Protection Program	6900 acres of pedestrian survey (in WA and OR); 106 cultural resources identified (in WA)
1347493/1351381/1351382/1351651/1351873/1351923	Windy Point Partners, LLC's Windy Point Wind Energy Project	2005/2007/2008	AINW/Historical Research Associates, Inc.	1024.8 acres of pedestrian survey and subsurface excavation at various sites; 64 cultural resources identified

DAHP Inventory No.	Project	Year	Entity	Description
1352565	Lockheed Martin Corporation's Goldendale NPDES Ponds Remediation Project	2008	AINW	7.2 acres of pedestrian survey; no cultural resources identified
1680108	Northwest Pipeline GP and Puget Sound Energy's Blue Bridge Pipeline Project	2008/2009	AINW	3,642 acres of pedestrian survey and subsurface excavation; 103 cultural resources identified
1685871	Windy Flats Partners, LLC's Windy Point II Wind Energy Project	2008/2009	AINW	414 acres of pedestrian survey; 29 cultural resources identified
NA[a]	Golden Northwest Binging Site Plan	2010	Plateau Archaeological Investigations, LLC (Plateau)	
1681201/1681751/1681752	Oregon Wireless Interoperability Network's Juniper #OW-01-0057 Communications Tower Project	2011	Plateau /Archaeological Services of Clark County, LLC	0.3 acres of pedestrian survey, site evaluation, and archaeological valuation of site 45KL2026
1682437/1683858/1684658	Klickitat County Emergency Management's Juniper Point New Tower Project	2012/2013	Lower Columbia Research and Archaeology, LLC/Yakama Nation CRP	0.1 acres of pedestrian survey and construction monitoring of site 45KL2026

AINW = Archaeological Investigations, Inc.; CARES = Conservation and Renewable Energy Systems; DAHP = Washington State Department of Archaeology and Historic Preservation; NPDES = National Pollutant Discharge Elimination System; CRP = Cultural Resources Program

[a] Although not shown in the DAHP database, this survey was identified as part of the review of DAHP site forms. Additional information will be identified for this and any other additional surveys within the area of potential effect during the cultural resources survey effort.

4.1.2 Previously Identified Cultural Resources

The density of documented archaeological sites is reported to be greatest in the lower reaches of streams, particularly near confluences with other streams. Large, dense archaeological village sites are most likely to be present in these locations. Confluences of any salmonid streams or any easily accessible areas along such streams are areas of high probability for archaeological sites. In upland locations, archaeological sites are more dispersed and associated with a greater variety of resources. Such sites are often lithic scatters, which are the stone-chip remnants of stone tool-making activities and stacked stone features on ridgelines. These can be observed anywhere that hunting, gathering, or camping may have taken place.

There have been 41 archaeological resource sites documented within 1 mile of the proposed Project (see Table 2.2-1 in Appendix G of this DLA) from previous studies. Those identified to be within the proposed APE are indicted in the first column of Table 2.2-1 in Appendix G. Of these, 36 consist of precontact archaeological sites, including isolated artifacts, lithic and artifact scatters, rock features, and a petroglyph; five consist of historic period archaeological sites, including an artifact scatter, residential features, and farmstead ruins. Lastly, one historic-period architectural resource was documented and consists of BPA's Horse Heaven-Harvalum No. 1 transmission line. Of these previously documented cultural resources, nine are considered eligible for inclusion in the National Register of Historic Places (NRHP), 10 are considered not eligible, and the remaining 22 are undetermined, unevaluated, or require further work/additional information to make a formal eligibility determination.

4.1.3 Yakama Tribe 2019 Survey

In response to early consultation with tribes, the Applicant contracted the Yakama Nation Cultural Resources Program (CRP) to perform an archaeological resources and TCP identification survey of the proposed APE in 2019. Yakama Nation CRP conducted the survey to meet the Secretary of the Interior's Standards and Guidelines for Identification as well as pertinent aspects of DAHP's standards for reporting. The study included documenting sites of religious or cultural importance to the tribes. Yakama Nation CRP, in consultation with the tribes, identified such locations and their spatial relationship to the Project. The survey report is summarize below and included as Appendix H (filed under Privileged Information). In addition to the survey, the report also includes a detailed literature search and review. A summary of the 2019 survey results is described below and in Appendix H.

The principal objective of the survey was to relocate existing sites and survey for any previously unrecorded archaeological, historic, or cultural properties within the proposed project APE. Activities undertaken to analyze the project included review of project plans, an examination of historic maps of the area, a review of the DAHP cultural site and cultural survey GIS database, an examination of the Yakama Nation cultural site atlas, and a field survey of the proposed APE. Additionally, CRP cultural specialists were consulted to identify any known significant cultural properties within the area. No subsurface testing was conducted for this stage of the investigation. The project was surveyed in July 2019 and included approximately 500 acres.

4.1.3.1 Survey Results

One new site (precontact lithic scatter) was encountered within the project APE. Seven (45KL566, 45KL567, 45KL569, 45KL570, 45KL744, 45KL745, and 45KL746) sites were relocated, and site forms were updated for those sites. Two sites were not relocated (45KL1712 and 45KL772). Three sites (45KL1296, 45KL1297, and 45KL1298) were not surveyed as they are outside of any area where project activities are anticipated to take place but appear within the

project APE boundary. Areas outside the tunnel entrances, laydown areas, and the dam footprint areas were not surveyed. The sites and their locations are described in detail in Appendix H.

4.1.3.2 TCP Analysis

Although the overwhelming majority of NRHP evaluations of properties determined to be "archaeological" sites have been done with a sole focus on their archaeological data, this approach only outlines a portion of the potential NRHP eligibility of a given site and may result in future management difficulties and potential damage if mitigation occurs. If the site is also eligible for an aspect of cultural value, archaeological data recovery will likely not be an appropriate means of mitigation.. Thus, the Yakama Nation CRP used four general criteria set forth in National Register Bulletin 15 (NPS 1997) to evaluate the potential significance of a TCP (Criterion A–D) listed below, described in detail in Appendix H:

- Criterion A—Association with Significant Event(s)
- Criterion B—Association with Significant Individual(s)
- Criterion C—Design, Construction, and/or Artistic Expression
- Criterion D—Information Potential

The Project area is located within an existing Multiple Property Documented TCP and is eligible for the NRHP under criterion A.

The entire Columbia Hills and the archaeological sites contained within are significant to the understanding of how Yakama people lived and utilized the land. Information yielded from "archaeological" resources is important to Yakama elders to determine what kinds of activities took place at a specific location. It also lends itself useful in identifying what kinds of resources are present.

The foods and medicines present within the TCP are contributing elements to its significance under Criteria A and B. During legendary times, the roots were beings, much like the animals, and walked and spoke like humans. At the time when humans were to arrive, the roots, like the water and earth beings, sacrificed themselves. In return, Tamanwitla (Creator) and the humans entered a Treaty that dictated a pact. The resources agreed to sacrifice themselves with the understanding that the human beings took care of all the resources. There is a certain order with which the resources sacrificed themselves starting with salmon, lamprey, deer, etc. Since some of these areas have been cut off from Yakama use, some of them are very rare and very sensitive. See Table 4.1-2 for vegetation encountered by the Yakama Nation within the Project area.

Table 4.1-2: Species Present at Juniper Point within the Goldendale Energy Storage Project APE

Scientific Name	Common Name
Achillea millefolium	Yarrow
Allium acuminatum	Tapertip onion
Lomatium laevigatum	Smooth desert-parsley (state-threatened species)
Lomatium nudicaule	Barestem biscuitroot
Lomatium triturnatum	Nine-leaf biscuitroot
Lomatium papilioniferum (L. grayi)	Pungent desert parsley
Lomatium macrocarpum	Biscuit root
Lomatium dissectum	Fernleaf buiscuitroot
Balsamorhiza sagittata	Arrowleaf balsamroot
Crataegus spp. (C. suksdorfii or C. douglasii)	Black Hawthorne
Rhus glabra	Smooth sumac
Juniperus occidentalis	Western juniper
Pinus ponderosa	Ponderosa pine
Eriogonum strictum var. proliferun	Strict buckwheat
Eriogonum thymoides	Thyme-leaved buckwheat
Erogonum compositum	Arrowleaf buckwheat
Lupinus latifolius	Columbia Gorge broad-leaf lupine
Ericameria nauseosa	Rubber rabbitbrush
Fritillaria camschatcensis	Chocolate lily
Rosa nutkana	Nootka rose
Triteleia hyacinthina	Brodiaea
Cirsium undulatum	Wavyleaf thistle
Crepis atribarba	Slender hawksbeard
Wyethia amplexicailis	Northern mule-ears
Lewisia rediviva	Bitterroot
Erodium cicutarium	Common stork's-bill
Claytonia perfoliata	Miner's lettuce
Apocynum androsaemifolium	Spreading dogbane
Uropappus lindleyi	Silver puffs
Amsinckia menziesii	Menzies' fiddleneck
Celtis laevigata	Netleaf hackberry
Delphinium nuttallianum	Nuttal's larkspur
Amelanchier alnifolia	Western serviceberry

4.1.3.3 Tribal Survey Conclusions

Based on Archaeological and Traditional Cultural Property Analysis, a detailed literature review and a pedestrian survey of the proposed project APE, 6 sites were encountered within the proposed project APE (45KL566, 45KL567, 45KL570, 45KL744, 45KL746, LS-3). Three sites

(45KL1296, 45KL1297, 45KL1298) are in the APE boundary but are outside the area proposed for project implementation. Two sites were not relocated (45KL1172, 45KL772).

The proposed Project area is within an NRHP-eligible TCP (Push-pum) and an NRHP-eligible Multiple Property Documentation TCP (Columbia Hills) and one Archaeological District (Columbia Hills District). In addition, there is an existing Programmatic Agreement between the Washington State Historic Preservation Office (SHPO) and BPA covering the upper portion of the APE. Within that Project area, there is a stipulation for BPA to create a plan that will allow tribal members to access Push-pum to gather foods and medicine significant to the tribe. Only the Yakama Nation can determine what is significant to the tribe.

Recommendations from the survey report are included in the consultation Section 10.0 below.

4.2 Potential Impacts to Historic Properties

There are known archaeological resources and TCPs within the proposed project APE and project footprint in the vicinity of the upper reservoir. However, there are no existing structures (new or historic) within the Project Boundary or APE, including both the upper and lower reservoir areas. As a result, impacts are limited to known and unknown archaeological resources, including damage during construction activities and/or permanent loss through land use conversion (e.g., constructing permanent structures over cultural resources). The scale and potential for impact depends on presence of eligible cultural sites, location of the facility, type of construction, and size of the footprint. Indirect effects (i.e., visual, auditory, vibrational, or atmospheric) caused by construction and/or operation activities could affect certain types of sensitive resources. Additionally, historic structures and buildings located outside the direct Project footprint could also be affected indirectly by the proposed Project, as visual, auditory, vibrational, or atmospheric impacts could compromise the properties' historic sense of setting, feeling, or character.

Construction and/or operation activities could have the potential to disrupt (via visual or auditory effects) traditional cultural use associated with cultural resources within the Project APE. The potential for impacts to archaeological resources and TCPs will be further defined during the licensing process and tribal consultation and will follow procedures and methods identified in the Attached HPMP (Appendix G) to evaluate if cultural resources are eligible to be managed as historic properties consistent with National Historic Preservation Act Section 106 requirements

4.2.1 Methodology and Evaluation Criteria

In consultation with the SHPOs and Indian tribes, FERC must apply the criteria of adverse effects to historic properties within the APE to evaluate the potential effects of the proposed Project, as codified in 36 Code of Federal Regulations (CFR) 800.5. This process is similarly applied to evaluation TCPs. Historic properties are districts, sites, buildings, structures, or objects included in, or eligible for inclusion on, the NRHP.

An adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of an historic property that qualify the property for inclusion in the NRHP. Adverse effects may include reasonably foreseeable effects that occur later in time, are farther removed, or are cumulative. Archaeological resources that are determined not eligible for listing in the NRHP will not receive further consideration under Section 106 during review of the proposed Project.

4.2.2 Potential Impacts

During the license proceedings, FERC will confer with consulting parties to determine the undertaking's effects on historic properties to resolve adverse effects and to develop mitigation measures as necessary; a Programmatic Agreement (PA) will be developed between FERC and the Applicant. After license issuance, the PA and HPMP (Appendix G) will be implemented after they are finalized during the final license application process.

Direct effects are generally caused by the undertaking and occur at the same time and place, while indirect effects caused by the undertaking are later in time or further removed in distance but are still reasonably foreseeable. For the proposed Project, the following is a summary of potential effect types that will be evaluated for development of a PA and finalization of the HPMP:

- Physical disturbance or damage caused by ground disturbance (e.g., digging);
- Introduction of visual, atmospheric, or audible elements that could diminish the integrity of the property's significant cultural features during short-term construction and operation of aboveground facilities and roads, as well as long-term effects from operation; and
- Change in the character of the use or of physical features within the historic property's setting that contribute to its significance.

Effects determinations have the following three possible outcomes:

- Finding of no affect: The undertaking does not have the potential to cause effects on historic properties that may be present.
- Finding of no adverse effect: The historic property will be affected; however, the effects of an undertaking do not meet the criteria of adverse effect, or measures have been taken to avoid or minimize adverse effects.
- Finding of adverse effect: The undertaking may affect the integrity, which will alter, directly or indirectly, any of the characteristics of the historic property that qualify it for inclusion in the NRHP. If an adverse effect is found, FERC will consult further to resolve the adverse effect.

The potential for the proposed Project to affect an historic property may depend on the Project stage and the development and use of the Project. Potential effects that may occur during the construction and operations of the proposed Project are discussed in the following subsections.

4.2.3 Construction

The proposed Project construction activities could affect historic property in a variety of ways, including the following:

- Possible physical damage within the construction footprint;
- Possible damage through vibrations caused by earth-moving and heavy equipment;
- Temporary loss of community access to TCPs;
- Potential permanent visual effects that alter the viewshed to or from a resource as it pertains to its setting and feeling;
- Potential temporary visual effects while heavy equipment and numerous personnel are present;
- Discovery of previously unknown historic properties within the construction footprint.

The duration of the construction phase will affect the degree of effects on historic properties. Many of the potential visual, visual, atmospheric, or audible effects during construction—such as noise, dust, vibrations, heavy equipment traffic, and certain changes in viewshed—could be temporary and will be expected to last for the duration of construction in specific areas and for discrete periods of time.

4.2.4 Operations

During the operations phase of the proposed Project, only previously surveyed and assessed areas will be expected to require periodic disturbance during the term of the license; therefore, the potential for additional physical effects to cultural resources will be limited. However, in the event of discovery of unanticipated cultural resources, the procedures outline in the HPMP shall be followed.

Indirect effects during operations could consist of a permanent change in viewshed to historic structures or TCPs near Project area facilities, and a periodic increase in noise, vibration, and dust created by vehicular traffic conducting operation and maintenance activities.

4.3 Applicant Recommendations

The Applicant will continue to consult with the SHPOs, tribes, and other agencies regarding appropriate measures for protection and/or mitigation of identified cultural resources following the processes and procedures outlined in the Project's draft HPMP. The consultation period

during development of the final license application will include addressing and satisfactorily resolving of the tribe's comments and recommendations. Also, the tribes and other interested agencies will be consulted regarding the final draft of the HPMP to ensure their comments and recommendations are considered. If archeological resources are discovered in the Project Boundary during the future studies or construction, analysis and appropriate avoidance measures will be implemented pursuant to the Project's final HPMP.

5.0 SOCIOECONOMICS

5.1 Existing Environment

Klickitat County has an economic history rich in agriculture, including cattle and sheep ranching, wheat, orchards, mining, and timber. These industries supply the majority of jobs, along with educational, health, and social services; local government; retail trade; manufacturing; and wood processing (City-data 2015). The recent increase in wind-powered energy, development of the Roosevelt Regional Landfill, and evolving leisure and hospitality industry have contributed to the region's economic diversity and new jobs. The Klickitat County unemployment rate decreased from 11 to 9 percent between 2011 and 2013 (Bailey 2013). The 2017 annual average unemployment rate in Klickitat County was 5.3 percent (Bureau of Labor Statistics 2018).

5.1.1 Households and Income

In 2017, the Klickitat County population was estimated at 21,811 with 10,432 housing units and an average household size of 2.54 people (U.S. Census Bureau 2018). In 2017, the median household income was $51,258, compared to $66,174 for the state of Washington, and 22.5 percent below the national average (U.S. Census Bureau 2018). Approximately 14.5 percent of Klickitat County residents earned an income below the poverty level in 2017 (U.S. Census Bureau 2018).

5.1.2 Geographic Mobility

From 2010 to 2011, 3.12 percent of Klickitat County residents moved into Klickitat from other counties within Washington State, and 5.41 percent relocated from another state (City-Data 2018). Ten or fewer residents moved to Klickitat from a foreign country (City-Data 2018). During the same timeframe, 2.89 percent of Klickitat county residents moved out of Klickitat County to other counties within Washington State, 4.06 percent relocated to other states, and 10 residents or fewer moved to foreign countries (City-Data 2018). In 2005, 92 percent of the population of Klickitat County lived in the same house as they had 1 year ago (City-data 2018).

5.1.3 Education

In 2017, 87.5 percent of the residents 25 years of age or older in Klickitat County had earned a high school diploma, while 25.8 percent had earned at least a bachelor's degree (U.S. Census

Bureau 2018). That same year in Washington State, 90.8 percent of residents 25 years of age or older had earned a high school diploma, while 34.5 percent have earned at least a bachelor's degree (U.S. Census Bureau 2018).

5.1.4 Industries

Agriculture, farming, and timber industries provide many jobs for Klickitat County residents, along with the rapidly growing leisure and hospitality industry. Currently, the largest private employer in Klickitat County is Roosevelt Regional Landfill, which is operated by Republic Services and KPUD. Roosevelt Regional Landfill not only provides 170 family wage jobs, it produces enough energy to power 15,000 homes by converting methane gas produced by decaying garbage into electricity (Judd 2012). The largest wood products manufacturer in the County is SDS Lumber Company. The company markets softwood, plywood, and dimension lumber nationwide. Agricultural activity within the county includes a variety of fruit, vegetables, berries, and cattle. Another major source of income to the county is the production of alfalfa hay, and there is new growth in the winery and grape growing industry.

In Klickitat County, the healthcare and social assistance industry employs approximately 880 people (Data USA 2016). Two main hospitals employ the majority of these: Skyline Hospital in White Salmon and Klickitat Valley Hospital in Goldendale.

Recreation and tourism also contribute to the local economy, including destination areas for fishing, camping, hunting, hiking, windsurfing, white water river rafting, biking, sailboarding, horseback riding, cycling, as well as snow and water skiing.

There are several dams located in the county, including the John Day Dam and The Dalles Dam, both of which are located on the Columbia River and have hydroelectric facilities with public interpretative centers.

Wind power generation in the Pacific Northwest has expanded from a few minor projects in the late 1990s to more than 7,500 megawatts of installed capacity in 2014. An Energy Overlay Zone (EOZ) Ordinance process was developed by the Klickitat County Planning Commission in response to the need for organized growth in alternative energy production. The EOZ, Washington renewable portfolio standards, and other incentives fueled the development of a number of new wind power projects in Klickitat County (McClure 2011). After the EOZ ordinance was established in 2005, seven new wind facilities were approved and developed across Klickitat County. Washington currently ranks 10th in the nation in for installed wind capacity, with the total capital investment of $6.1 billion in wind projects (AWEA 2017), resulting in $141.3 million dollars cumulative public revenue, 2,150 temporary construction jobs, and 215 permanent onsite jobs (Renewable Northwest 2018). Local wind power projects employ a range technicians and specialists who travel to Klickitat County for their work, providing a substantial source of income for Goldendale restaurants, hotels, and other retailers (Ross 2009).

5.1.5 Occupation and type of Employer

In 2016, the Washington State Employment Security Department found the jobs in Klickitat County fit into nine categories (WAESD 2017). The number of jobs provided by occupation type includes seasonal, part-time, full-time, permanent, and temporary jobs.

- Government—24 percent;
- Agriculture—23 percent;
- Manufacturing—18 percent;
- All other—15 percent;
- Retail trade—5 percent;
- Health care and social assistance—5 percent;
- Accommodation and food services—4 percent;
- Administrative and waste services—4 percent; and
- Transportation and warehousing—2 percent.

5.1.6 Travel to work

In 2011, approximately 39 percent of employed Klickitat County residents worked outside of the county (City-Data 2012). Of the people employed in Klickitat County, 73.5 percent live in Klickitat County (City-Data 2018). The mean commute travel time is approximately 21.9 minutes (City-data 2018).

5.1.7 Housing

While two-thirds of the residents live in unincorporated areas, the majority of the county population is located in or near Goldendale, Bingen, or White Salmon. In 2016, the mean price for a detached home within Klickitat County was $277,638, compared to $193,363 in 2009, an increase of $84,275 in 7 years (City-Data 2018). The mean price for a home in Washington State was $404,096 in 2016 (City-Data 2018). The median monthly cost of renting an apartment or house in Klickitat County was $699 in 2016, while the monthly cost in Washington State for an apartment rental was $999 (City-data 2018).

5.2 Potential Resource Impacts

The proposed Project is a multi-billion-dollar infrastructure investment that will provide numerous temporary construction jobs, permanent maintenance, and operation positions, and will further contribute to the region’s economic diversity and tax base. Project costs include engineering, equipment procurement, permitting, and construction over the Project development

schedule from pre-construction through construction and start-up. Pre-construction spending will go primarily to licensing, engineering, and design services. Long-term impacts include Project operations and maintenance.

The economic impacts of the Project were estimated in a study completed by Highland Economics in 2019 (Appendix I). The impacts described in the following section are the results of that study and based on an assumed construction cost of $2.8 billion and an estimated operating budget of approximately $16.6 million (HDR 2019).

5.2.1 Employment and Wage Impacts

Project direct employment and wages estimated in the 2019 study by location of residency are show in Table 5.2-1 below.

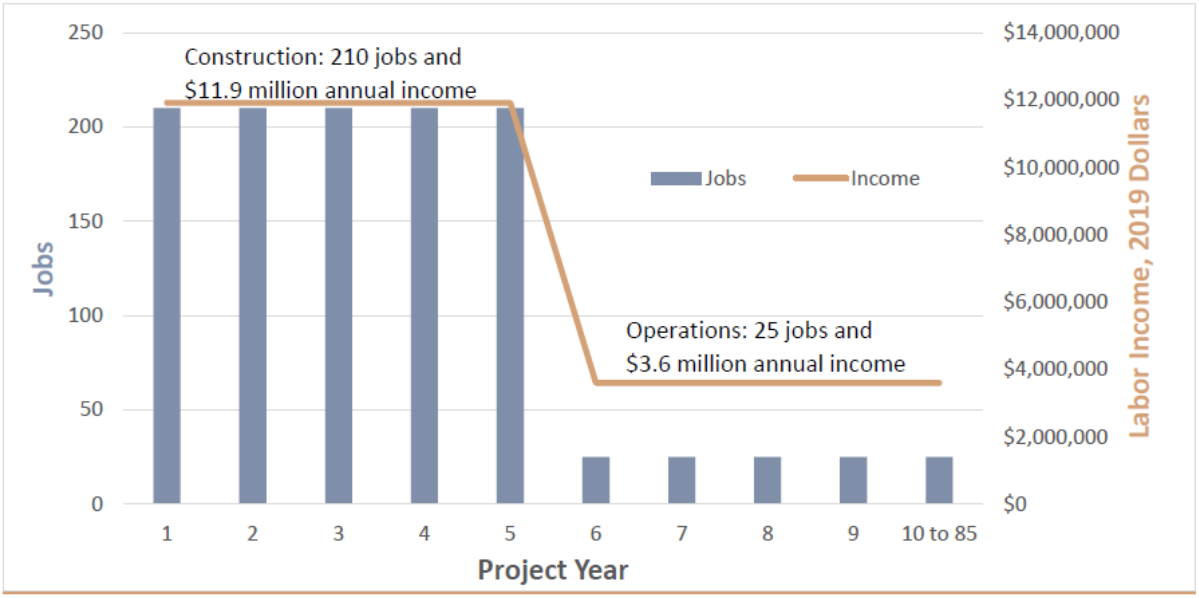
Table 5.2-1: Total Economic Impacts by Location of Residency in the 2019 Study

Location of Residency	Phase	Direct Jobs (Job-Years)	Income
Klickitat County	Construction (Project Life)	900 to 1,100	$53.6M to $65.6M
	Operations (Annual)	20 to 30	$3.0M to $4.1M
Total Oregon/Washington	Construction (Project Life)	6,900 to 8,400	$649.9M to $749.5M
	Operations (Annual)	110 to 150	$12.0M to $16.3M

Source: Highland Economics 2019

$M = million dollars

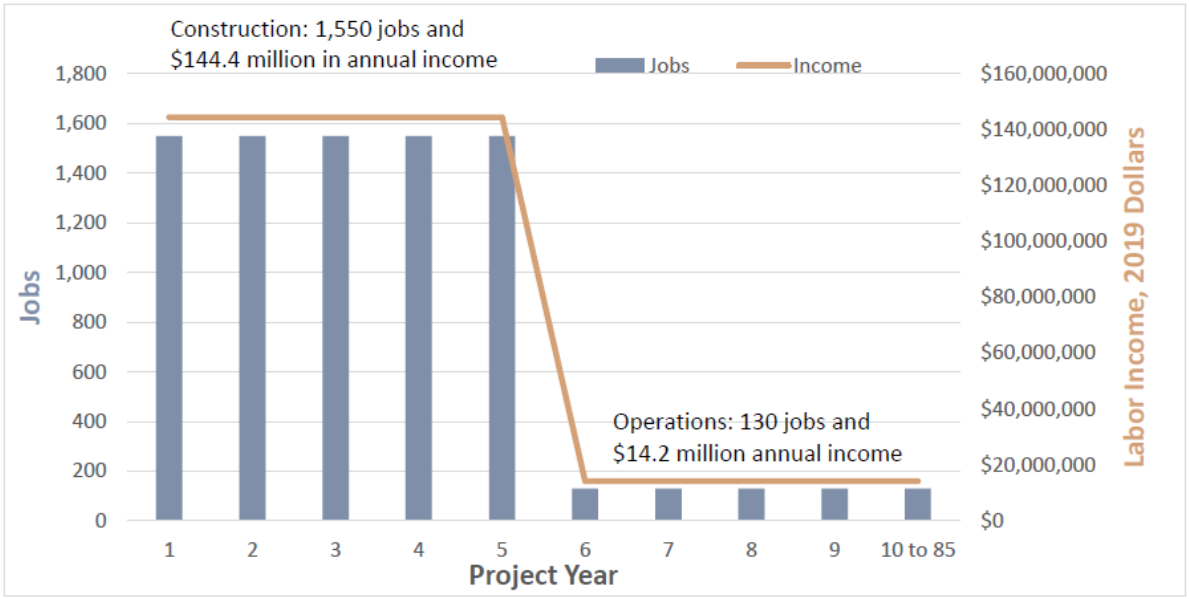
The 2019, economic analysis used the Davis-Bacon 2019 prevailing wage and fringe benefits for construction equipment operators in Klickitat County, Washington, and the Dalles/Hood River, Oregon, with a mid-point of approximately $54 per hour or $112,000 per year, assuming 2,080 annual hours of compensation, to estimate construction worker jobs and income. A mid-point estimate of annual economic impacts in the study area during 5 years of construction and approximately 80 years of operations in Klickitat County are shown in Figure 5.2-1. In Klickitat County, during each of the 5 years of construction, the Project may directly and indirectly support approximately 210 jobs and $11.9 million in annual income; during operations, the Project may directly and indirectly support approximately 25 jobs and $3.6 million in annual income.



Source: Highland Economics 2019

Figure 5.2-1: Total (Direct, Indirect, and Induced) Jobs and Income Supported in Klickitat County, Mid-Point Estimates

The 2019 study estimated that construction of the Project will generate a total of 1,550 jobs in Washington and Oregon, which will generate approximately $144.4 million in annual income. Project operations were estimated to support approximately 130 jobs and $14.2 million in annual income (see Figure 5.2-2 below).



1/Includes impacts for Klickitat County.

Figure 5.2-2: Total (Direct, Indirect, and Induced) Jobs and Income Supported in Washington and Oregon, Mid-Point Estimates

By definition, all on-site jobs associated with construction will be direct jobs in Klickitat County. These workers include craftspeople, engineers, project managers, and others who provide on-site support services. Direct jobs associated with the proposed Project will also benefit employees in other parts of Washington, Oregon, and elsewhere in the United States.

5.2.2 In-Migration to the Project Area

While it is anticipated that there will be a temporary influx of construction workers during the Project construction phase, there is no indication that the permanent in-migration to the area will have a significant impact on the area's government facilities and services. There will be approximately 40 to 60 direct employees at the Project during operations, earning $7 million to $9.6 million annually in labor income. Of these, approximately 15 to 20 may be Klickitat County residents (earning approximately $2.8 million to $3.8 million), with the remainder residing elsewhere in Washington or Oregon. Adding secondary impacts (indirect and induced impacts) to the direct impacts results in an estimated *total economic impacts* in Klickitat County during operations of 20 to 30 jobs. Some workers who relocate to the area will be expected to move to Goldendale, Washington, while others may choose to live in nearby communities such as The Dalles, Oregon, and Klickitat, Sherman, or Wasco County communities. Because some workers will be local and would not need to relocate, and others will disperse throughout the area, the permanent migration into the Project area due to the Project is not anticipated to strain existing government facilities and services.

5.2.3 Housing Impacts

The closest town to the Project is the City of Goldendale, Washington (19 miles). Other nearby communities expected to provide potential housing to Project workers are Centerville, Washington (19 miles); Wishram, Washington (17 miles); Rufus, Oregon (17 miles); and The Dalles (31 miles), Oregon. Housing and housing vacancy rates are provided in Table 5.2-2 below. Rental vacancy rates are anticipated to be adequate to accommodate the in-migration of permanent Project personnel. Since the majority of construction personnel will be relocating temporarily, some are expected to travel and stay in their recreational vehicle, as is common practice for construction projects in remote areas. Others are anticipated to either commute or find temporary housing from the available rental units in nearby communities.

There will be no residences or business establishments displaced by the proposed Project.

Table 5.2-2: Housing and Vacancy Rates

	Total Housing Units (number)	Total Vacancies (number)	Vacant Housing Units (%)
Klickitat County	9,797	1,778	18.1
Goldendale	1,598	133	8.3
Wishram	208	44	21.2
Sherman County	938	111	11.8
Rufus	122	19	15.6
Wasco	248	36	14.5
Wasco County	11,438	1,826	16.0
The Dalles	6,582	526	7.6

Source: U.S. Census Bureau 2015

5.2.4 Effects on Local Government and Services

According to the 2019 study included as Appendix I, in addition to the employment and income impacts presented above, the Project will contribute to tax revenues in local and state jurisdictions. In particular, property taxes will increase in Klickitat County, sales/use taxes will increase in Washington State and Klickitat County, and income taxes will increase in Oregon. The analysis did not estimate the impact on property taxes, vehicle license fees, or business license fees that may be paid by Project employees or businesses supplying inputs to the Project, as it is likely that there will be only a small increase in these taxes associated with economic activity supported by the Project (i.e., it is likely that these taxes will be paid by state residents and businesses at similar values without the Project). Taxes paid by the Project, its suppliers, and its employees are challenging to estimate for a number of reasons, including the size of the Project, uncertainty regarding material sourcing and expenditures, and uncertainty regarding potential property tax abatement agreements. That said, this section provides an overview of some of the key taxes that will apply to the Project and the potential magnitude of associated tax revenues to state and local jurisdictions, as reported in the 2019 study.

Klickitat County property taxes are assessed at $10.05 per $1,000 of assessed value. According to the county assessor, for energy facilities, property taxes are assessed on the full construction value the first year after construction, and then are assessed based on the net profit of the facility. As such, the first year after Project construction, property taxes paid to Klickitat County by the Project may be as much as $20 million to $30 million. Thereafter, the value would fluctuate based on the net profitability of the Project. These property taxes will support local jurisdictions and county services in Klickitat County.

Sales and use taxes in unincorporated portions of Klickitat County total 7 percent, of which 0.5 percent goes to Klickitat County and 6.5 percent goes to the State (Washington State Department of Revenue 2019). Based on historical data on sales and use taxes paid by the power and communications construction sector (as estimated by IMPLAN), total sales and use taxes paid by the Project may be approximately $12.3 million during construction. Sales taxes paid by

suppliers may be as much as $25.5 million, for a potential total of $37.8 million in tax revenues during construction. The fraction of this that may go to Klickitat County would be $2.7 million. Based on historical data on sales and use taxes paid by the power generation sectors (as estimated by IMPLAN), total annual sales and use taxes paid by the Project may be approximately $0.5 million to $1 million during operations.

While Oregon does not have a sales tax, it does have an income tax. On average, Oregon residents pay approximately 6 percent of their total adjusted gross income to the state in income tax (Oregon Department of Revenue 2019). During construction, an estimated $270 million will be paid to workers residing in Oregon or outside Klickitat County in Washington. Conservatively assuming that half of these wages will be paid to workers residing in Oregon (for wages of approximately $135 million), and assuming 6 percent of these wages will be paid in income tax, this equates to approximately $8 million in state income taxes, or approximately $1.6 million in income tax annually in each of the 5 years during construction. During operations, income tax to Oregon may be approximately $300,000 annually. These values account only for the potential income tax paid by Project workers. Total income tax to Oregon will also include tax paid on income to Project suppliers based in Oregon.

Thus, during construction, taxes may increase by a total of approximately $60 million to $70 million in Washington State, or approximately $12 million to $14 million annually over the 5 years of construction. Income tax to the State of Oregon during construction will likely total upwards of $8 million ($1.6 million annually). During operations, taxes will increase by a smaller amount.

5.2.5 Economic Impact Summary

With construction expenditures of over $2.8 billion and an estimated operating budget of approximately $16.6 million, the Goldendale Project will increase demand for labor, materials, and services in Klickitat County and the states of Oregon and Washington. Direct employment and income for people involved in planning and constructing the Project is estimated to total over the 5-year construction period approximately 3,000 to 3,600 job-years and $600 million to $734 million in total labor income. On an average annual basis, this equates to approximately 600 to 700 jobs and $120 million to $147 million in labor income annually. Of these, Klickitat County residents may fill 40 to 50 jobs and receive approximately $4.9 million to $6.0 million in annual labor income. In total, residents from Washington or in Oregon may fill approximately 460 to 570 construction and planning phase jobs and receive approximately $57 million to $70 in annual labor income.

Including ripple effects in other sectors, total economic activity supported by the Project in Klickitat County during construction is estimated to total 900 to 1,100 job-years and $53.6 million to $65.6 million in total labor income. In total, in all of Washington and Oregon, 6,900 to 8,400 jobs years and $650 million to $795 million in labor income will be supported. On

an average annual basis, this equates to approximately 190 to 230 jobs and $10.7 million to $13.1 million in labor income annually in Klickitat County. In total in Washington and Oregon, this equates to approximately 1,390 to 1,730 jobs and $130 million to $159 million in labor income annually.

During operations, there will be approximately 40 to 60 direct Project employees earning $7 million to $9.6 million annually in labor income. Of these, approximately 15 to 20 may be Klickitat County residents (earning approximately $2.8 million to $3.8 million annually), with the remainder residing elsewhere in Washington or Oregon. Adding the ripple effects (or indirect and induced effects) in other sectors results in an estimated total economic impact in Klickitat County during operations of 20 to 30 jobs and $3.0 million to $4.1 million in labor income annually. For all of Washington and Oregon, total economic impacts during operations are estimated to be approximately 110 to 150 jobs and $12 million to $16.3 million in labor income annually.

In terms of fiscal impacts, during construction, taxes may increase by a total of approximately $60 million to $70 million in Washington State, or approximately $12 million to $14 million annually over the 5 years of construction. Income tax to the State of Oregon during construction will likely total upwards of $8 million ($1.6 million annually). During operations, taxes will increase by a smaller amount.

5.3 Applicant Recommendations

As proposed in the Pre-Application Document (PAD), an updated socioeconomic analysis of the proposed Project impact was completed in 2019; these results are reported above and available in Appendix I. No additional recommendations are made.

6.0 GEOLOGY AND SOILS

6.1 Existing Environment and Geology

The proposed Project is located on the southern margin of the Columbia Hills, on the north side of the Columbia River, within the Yakima Fold and Thrust Belt portion of the Columbia Plateau Physiographic Province. The Columbia Plateau covers approximately 63,000 square miles, within which the ground surface ranges in elevation from approximately 200 to 3,000 feet. Mountains surround the plateau on all sides: the Cascade Range to the west, the Okanogan Highlands to the north, the Clearwater Range to the east, and the Blue Mountains to the south (Shannon & Wilson, Inc. 2002) (Figure 6.1-1).

Created By: Kelly Lyons Date: 11/26/2019 Project: 0483340

Upper Intake
Lower Intake
Rufus
John Day Substation
Columbia River
John Day River
Gilliam
Sherman
WASHINGTON
OREGON

Legend

Proposed Reservoir
Proposed Laydown Area
Proposed Project Boundary

Washington Faults & Folds

Dip-Slip Movement

- Normal fault - Identity and existence certain, location accurate.[43]
- Normal fault - Identity and existence certain, location concealed.[45]
- Thrust fault - Identity and existence certain, location accurate.[7]
- Thrust fault - Identity and existence certain, location concealed.[9]

Strike-Slip Movement

- Right-lateral strike-slip fault - Identity and existence certain, location accurate.[13]
- Right-lateral strike-slip fault - Identity and existence certain, location concealed.[15]
- Left-lateral strike-slip fault - Identity and existence certain, location accurate.[19]

Movement Unknown

- Fault, unknown offset - Identity and existence certain, location accurate [1]
- Fault, unknown offset - Identity and existence certain, location concealed [3]

Fractures

- Fracture - Identity and existence certain, location accurate [25]
- Fracture - Identity and existence certain, location concealed [27]
- Anticline - Identity and existence certain, location accurate [1]
- Anticline - Identity and existence certain, location inferred [37]
- Anticline - Identity and existence certain, location concealed [3]
- Syncline - Identity and existence certain, location accurate [13]
- Syncline - Identity and existence certain, location concealed [15]
- Monocline, anticlinal bend - Identity and existencecertain, location accurate [31]
- Monocline, synclinal bend - Identity and existence certain, location concealed [27]

Washington Geologic Units

Unconsolidated Sediments

- Quaternary alluvial fans (Qaf), beach deposits, landslides (Qls), and talus (Qta)
- Quaternary alluvium, dune sand, loess, and artificial fill (Q1)
- Pleistocene continental glacial, glacio-lacustrine, and outburst flood deposits, Fraser-age (Qfg)

Sedimentary Rocks and Deposits

- Quaternary-Miocene continental sedimentary rocks

Volcanic Rocks and Deposits

- Quaternary and Quaternary-Pliocene undifferentiated volcanic rocks
- Quaternary-Tertiary volcanic rocks
- Miocene Columbia River Basalt Group, Wanapum Basalt, MV(wpr) Priest Rapids Member, MV(wr) Roza Member, and MV(wfs) Frenchman Springs Member
- Miocene Columbia River Basalt Group, Grande Ronde Basalt: MV(gN2) Flows of normal magnetic polarity and MV(gR2) Flows of reverse magnetic polarity

N

0 1 2 Miles

0 50 100 Miles

Figure 6.1-1
Geology
Draft License Application
Goldendale Energy Storage Project
Goldendale, WA

Environmental Resources Management
www.erm.com

FILE: M:\Projects\Goldendale Energy Storage Project\maps\DLA 2019\Figure 6.1-1 Project Geology.mxd | REVISED: 11/26/2019 | SCALE: 1:63,360 when printed at 11x17

Source: National Agricultural Imagery Program, July 2017, flown 1m per pixel; NAD 1983 StatePlane Washington South FIPS 4602 Feet

The rocks of the Columbia Plateau are primarily accumulations of successive lava flows that erupted during the middle Miocene epoch. These lava flows are several thousand feet thick across most of the Columbia Plateau area, including in the proposed Project Boundary, and are the result of numerous massive eruptions of basaltic lavas from vents near the southeast corner of Washington State. In many places, sedimentary units of variable thickness are present between the flows, marking quiescent periods between eruptions that allowed lacustrine and fluvial sediments to accumulate as the regional surface water flow adjusted to the new topography and drainage conditions introduced by each lava flow.

From the Pliocene epoch through the present, uplift of the Columbia Plateau has introduced multiple folds and faults across the region, and has allowed stream erosion to cut across deep sections of the original rocks emplaced during the Miocene. Some of the most pronounced erosion of these rocks occurred during the most recent glaciation period of the Pleistocene epoch, when multiple advances of glacial ice created a massive lake in the vicinity of Missoula, Montana. As the continental ice sheet advanced and retreated, periodically blocking the ancestral Columbia River, catastrophic draining of Lake Missoula caused massive floods that spread across the Columbia Plateau region, scouring the landscape throughout the area and through the Columbia River Gorge west of the proposed Project. These floods (known as the "Missoula floods") not only scoured materials from upland areas, but deposited sediments in local basins and along the course of the Columbia River.

Geology at the proposed Project includes Pleistocene to Holocene sediments over Miocene basalt flows along the Columbia River and Miocene basalt flows in the upland portions of the Project Boundary. The Miocene basalt flow exposures along the steep slope north of the Columbia River in the proposed Project Boundary are partially obscured by locally generated talus and scree. Widespread loess is present at the surface of and in the immediate vicinity of the portion of the proposed Project Boundary at the top of the steep slope. Evidence of thrust faulting, strike-slip faulting, and folding of the Miocene basalt rocks is present in the proposed Project Boundary. Quaternary landslide deposits have also been mapped in the Project vicinity (Phillips and Walsh 1987).

A stratigraphic section of the Project vicinity is included in Figure 6.1-2.

Series	Group	Formation	Member	Isotopic Age (m. y.)	Magnetic Polarity
Miocene, Upper	Columbia River Basalt Group	Saddle Mountains Basalt	Lower Monumental Member	6	N
			Ice Harbor Member	8.5	
			Basalt of Goose Island		N
			Basalt of Martindale		R
			Basalt of Basin City		N
			Buford Member		R
			Elephant Mountain Member	10.5	R,T
			Pomona Member	12	R
			Esquatzel Member		N
			Weissnefels Ridge Member		
			Basalt of Slippery Rock		N
			Basalt of Tenmile Creek		N
			Basalt of Lewiston Orchards		N
			Basalt of Cloverland		N
			Asotin Member	13	
			Basalt of Huntzinger		N
			Wilber Creek Member		
			Basalt of Lapwai		N
			Basalt of Wahluke		N
			Umatilla Member	13.5	N
			Basalt of Sillusi		N
			Basalt of Umatilla Member		N
Miocene, Middle		Wanapum Basalt	Priest Rapids Member	14.5	
			Basalt of Lolo		R
			Basalt of Rosalia		R
			Roza Member		T,R
			Shumaker Creek Member		N
			Frenchman Springs Member		
			Basalt of Lyons Ferry		N
			Basalt of Sentinel Gap		N
			Basalt of Sand Hollow	15.3	N
			Basalt of Silver Falls		N,E
			Basalt of Ginkgo		E
			Basalt of Palouse Falls		E
			Eckler Mountain Member		
			Basalt of Dodge		N
			Basalt of Robinette Mountain		N
			Vantage Horizon		
Miocene, Lower		Grande Ronde Basalt (Prineville Basalt)	Member of Sentinel Bluffs	15.6	N_2
			Member of Slack Canyon		
			Member of Field Springs		
			Member of Winter Water		
			Member of Umtanum		
			Member of Ortley		
			Member of Armstrong Canyon		
			Member of Meyer Ridge		R_2
			Member of Grouse Creek		
			Member of Wapshilla Ridge		
			Member of Mt. Horrible		
		Picture Gorge Basalt	Member of China Creek		N_1
			Member of Downey Gulch		
			Member of Center Creek		R_1
			Member of Rogersburg		
			Member of Teepee Butte		
			Member of Buckhorn Springs	16.5	
		Imnaha Basalt		17.5	R_1 / **T** / N_0 / R_0

Figure 6.1-2
Project Area Stratigraphy
Draft License Application
Goldendale Energy Storage Project
Goldendale, WA

Environmental Resources Management
www.erm.com
ERM

6.1.1 Miocene Basalt

Miocene Columbia River basalt flows mapped in the vicinity of the proposed Project include the Roza, the Priest Rapids, the Frenchman Springs Members of the Wanapum Basalt, and two sets of flows of the Grande Ronde Basalt. The Project is in an area of moderate folding and faulting of the underlying Miocene Columbia River basalt flows as discussed below in Section 6.1.4. The Columbia Hills Anticline, a broad east-west trending anticlinal arch that underlies the Columbia Hills, is the primary structural feature of the site vicinity. A thrust fault associated with the southern limb of the anticline crosses the proposed Project area trending west-southwest to east-northeast. Local folds and faulting have obscured the surface expression of basalt stratigraphy near the Project.

The oldest flows within the proposed Project Boundary are the Grande Ronde Basalts, which are the rocks forming the bench along the north side of the Columbia River and most of the steep slope portion of the proposed Project Boundary. The Frenchman Springs Member caps the top of the slope and covers most of the upper Project area with scattered outcrops of the Roza Member.

Nearly all of the Miocene basalt flows in the proposed Project Boundary dip somewhat steeply to the south, toward the Columbia River. This apparent dip is noted based on the angle of the depositional contacts mapped between the units as they cross slopes in the map area.

Regionally, the basal unit of the Frenchman Springs Member is the Basalt of the Gingko flow unit that commonly overlies river and lake deposits on the top of the last Grande Ronde flow known as the Vantage Sandstone. Regional water wells data suggests that the Vantage may be 3 to 20 feet thick (Camp et al. 2017). The Vantage Sandstone is usually concealed by talus and debris, so natural exposures are few (Lasmanis 1985). Even when missing, the top of the Grande Ronde rock is commonly characterized by a deeply weathered, chemically altered, and decomposed “rotten rock” (Camp et al. 2017) that may act as a major water-bearing zone (Lasmanis 1985). An internal email from a former Project consultant stated that the Vantage interbed is found in the bluff face of the Project but this has not been confirmed.

6.1.2 Quaternary Deposits

Pleistocene and Holocene deposits within the proposed Project Boundary and in the vicinity include:

- Loess deposits;
- Alluvial fan deposits;
- Landslide deposits;
- Talus deposits; and
- Spokane/Missoula Flood deposits.

Each of these units is mapped within or immediately adjacent to the proposed Project Boundary, as shown in Figure 6.1-1.

Loess deposits are characterized by unconsolidated silt and fine sand deposits of variable thickness deposited from windblown sediments related to past continental glaciation conditions in Eastern Washington. These deposits are widespread across the surface in the upland area of the proposed Project area north of the steep slope top.

An alluvial fan deposit is mapped just west of the proposed Project area at the base of the steep slope north of the Columbia River. The alluvial fan deposits in the region generally consist of sand, gravel, and boulders deposited near the base of steep slopes along streams and storm water channels. Some of these deposits include evidence of debris flows, such as large boulders entrained in the deposits.

Two Quaternary landslides are mapped in the vicinity of the Project. Both landslide deposits appear to be developed from material that has collapsed from the upper portions of the steep southern slope of the Columbia Hills ridgeline. One landslide mass covers a broad area approximately 0.25 mile west of the site, and one deposit is situated on the face of the steep slope approximately 1 mile northeast of the site. Landslide deposits in the area consist of large lithic blocks in a matrix of finer sediment debris and thick deposits of angular fragments of basaltic talus accumulating at the base of steep slopes. Large landslide deposits are common, originating in the slopes above the northern bank of the Columbia River, and areas of deep bedrock instability are reported in the south slopes of the Columbia Hills in the site vicinity (Sager 1989).

Accumulations of talus form a broad, irregular apron along the base of the steep slope that runs through the center of the Project area. The talus consists primarily of angular basaltic fragments that have fallen directly from the cliffs and steep slopes above.

The Spokane/Lake-Missoula Flood deposits are characterized by silt, sand, gravel, and boulders of variable and diverse composition deposited in a high-energy environment associated with approximately 40 separate glacial outburst floods that occurred during the most recent Pleistocene glaciation stage. These deposits in the proposed Project area include a relatively thin veneer of sediments on the Miocene basalt bedrock bench immediately adjacent to the Columbia River in the western portion of the site and in terrace deposit remnants situated against the bottom of the steep slope at the northern edge of that bench.

6.1.3 Soils

Soils within the proposed Project Boundary are characterized within three general areas:

- The former CGA smelter site and proposed lower reservoir area;
- The proposed upper reservoir area; and
- The steep slope between the proposed reservoir areas.

Soils in each of these areas are distinct. Although several soil designations may be described in each area, the general characteristics of the soils share many common traits. Soil information described in this section is derived from the U.S. Department of Agriculture (NRCS 2019).

6.1.3.1 Former CGA Smelter Site and Lower Reservoir Area

The majority of the lower reservoir will be constructed in an area currently occupied by a closed Solid Waste Management Units (SWMUs) described in more detail in Section 6.2. The soils that are not already disturbed by smelter activities generally consist of a mixture of Horseflat and Dallesport cobbly silty loams, Ewall loam sand, bedrock outcrops with hyploxeroll soils, and urban land associated with developed areas of the former CGA smelter site. In the Project area, Horseflat soils are typically developed in loess over basalt and on colluvium containing basalt fragments and loess on and at the base of steep slopes. Dallesport and Ewall soils are typically developed on outburst flood sediment deposits containing a mixture of cobbles, sand, and silt. The hyploxeroll soils are typically a thin alluvium cover over bedrock.

Each of these soils is described as well-drained. The moderately high to high water draining capacity of the Horeseflat, Dallesport, and Ewall soils is reflected in the low to moderate water erodibility of soils by water and wind summarized in Table 6.1-1. Wind erodibility is moderately low for Horseflat soils, low to moderately high for Dallesport soils, high for the Ewall soils, and moderately high for haploxeroll soils.

Table 6.1-1: Soil Erodibility Characteristics

Name of Primary Soils	Range of Water Erosion Factors		Wind Erodibility Group	Wind Erodibility Index
	Kw	Kf		
Lower Reservoir Area				
Ewall	0.10	0.10	2	134
Dallesport	0.02–0.28	0.28–0.43	3–7	38–56
Haploxerolls	0.15–0.32	0.32	3	86
Horseflat	0.10–0.20	0.37–0.43	6	48
Upper Reservoir Area				
Goldendale	0.37–0.43	0.37–0.43	5	56
Lorena	0.37–0.43	0.37–0.43	5	56
Rockly	0.10	0.37	8	0
Slope Between Reservoir Areas				
Haploxerolls	0.15–0.32	0.32	3	86
Horseflat	0.10–0.20	0.37–0.43	6	48
Onyx	0.15–0.43	0.32–0.43	5	56
Rockly	0.10	0.37	8	0

Sources: NRCS 2019

Water Erosion Factors: Kf = Fine fraction soil (grain size less than 2 millimeters) erosion rate of tons per acre per year; Kw = Whole soil erodibility
Range of Kw and Kf erosion potential factors: 0.02 - 0.15 = Low, 0.16 - 0.28 = Moderately Low, 0.29 - 0.43 = Moderate, 0.44 - 0.55 = Moderately High, 0.56 - 0.69 = High
Wind Erosion Factors: Wind Erosion Group is a dimensionless score ranging from 1 (highly erodible) to 8 (not erodible)
Wind Erodibility Group scoring: 1 - 2 = High, 3 - 4 = Moderately High, 5 - 6 = Moderately Low, 7 - 8 = Low
Wind Erodibility Index estimates susceptibility to wind erosion in tons per acre per year
Wind Erodibility Index ranges: 0 - 62 = Low, 63 - 124 = Moderately Low, 125 - 186 = Moderate, 187 - 248 = Moderately High, 249 - 310 = High

6.1.3.2 Upper Reservoir Area

Soils in the upper reservoir area primarily consist of a mixture of Lorena silt loam and Goldendale silt loam, with some areas of Rockly very gravelly loam. The Lorena and Goldendale soils are both mixtures of basalt alluvium, colluvium, and residuum; loess; and minor volcanic ash. Lorena soils are predominantly weathered basalt, and Goldendale soils are predominantly loess. Rockly soils are predominantly basalt colluvium with some loess and minor volcanic ash. Rockly soils are predominant along the top of the steep slope separating the lower reservoir area from the upper reservoir area.

Each of these soils is described as well-drained. The moderately high water draining capacity of these soils is reflected in the low to moderate water erodibility of soils summarized in Table 6.1-1. Wind erodibility is moderately low for the haploxerolls and for the Lorena and Goldendale soils, and low for the Rockly soils.

6.1.3.3 Steep Slope between Reservoir Areas

Soils on the steep slope separating the reservoir areas are sparse, consisting primarily of rock outcrops and rubble with a veneer or pockets of heploxeroll soils; Horseflat sobbly silty loam and Horseflat soils complexed with other, similar soil types; Rockly very gravelly loam; and minor Onyx silt loam. Rock outcrops and colluvium with associated areas of haploxeroll soils cover much of the steep face of the slope. Horseflat soils are typically developed in loess over basalt and on colluvium containing basalt fragments and loess on and at the base of steep slopes. Rockly soils are predominantly basalt colluvium with some loess and minor volcanic ash, and are predominant along the top of the steep slope separating the lower reservoir area from the upper reservoir area. Onyx soils consist of alluvium lying on nearly flat ground.

Each of these soils is described as well-drained. The moderately high water draining capacity of these soils is reflected in the low to moderate water erodibility of soils summarized in Table 6.1-1. Wind erodibility is low for the haploxerolls, moderately low for Horseflat soils, low for Rockly soils, and moderately low for Onyx soils.

6.1.4 Geologic Structures

The Project is in an area of moderate folding and faulting of the underlying Miocene Columbia River basalt flows. Geologic structural details in the proposed Project vicinity are included on the geologic map in Figure 6.1-1.

The Columbia Hills Anticline, a broad east-west trending anticlinal arch that underlies the Columbia Hills, is the primary structural feature of the region. Several minor local flexures associated with the anticline are present in the site vicinity. A thrust fault associated with the southern limb of the anticline crosses the proposed Project area trending west-southwest to east-northeast, and anastomoses into two separate limbs to the west of the site. Two generally northwest-southeast trending faults—one the Goldendale strike-slip fault and the other a combination strike-slip and normal fault—intersect the thrust fault in the site vicinity. The latter fault passes directly through the former CGA smelter area.

The age of the folding and faulting in the area is not well understood, although there is evidence that the folding and faulting was active during emplacement of the Miocene basalt flows and continued through approximately 4 million years ago (Reidel et al. 1989). To the west of the Project area, faults associated with the structures are overlain by volcanic rocks approximately 900,000 years old, indicating that the faulting is older than that date.

6.1.5 Groundwater

The existing environment of groundwater in the Project vicinity is included in Section 2.1.4.

6.1.6 Seismicity

Six earthquakes with a magnitude greater than 1.0, the greatest being 2.7, were reported within 5 miles of the Project Boundary between 1970 and 2017 (PNSN 2019). Two of the earthquakes, recorded in 2009 and 2012, were shallow (less than 1 kilometer) and were located approximately 3 to 4 miles west of the proposed Project Boundary at the location of a historic landslide. Four earthquakes occurred east of the proposed Project Boundary. The closest earthquake occurred approximately 2 miles east of the proposed Project in June 2017 and had a reported magnitude of 1.7 at a depth of 8.4 kilometers.

Other nearby fault zones considered potentially active are the Oak Flat-Luna Buttes Fault Zone (12 miles from the proposed Project Boundary) and Arlington-Shutler Buttes Fault Zone (16 miles from the Project Boundary). The Oak Flat-Luna Buttes fault zone is predicted to be capable of a maximum earthquake magnitude of 6.4 to 6.9, and the maximum magnitude for the Arlington-Shutler Buttes Fault Zone ranges from 6.6 to 7.1 (Wong et al. 2000). Both fault zones are assigned a low to moderate probability of activity. The results of a 2002 liquefaction study indicated that discontinuous layers within the silty sand and sand fine-grained facies of the Missoula Flood Deposits are susceptible to liquefaction near the proposed Project.

The thrust faults in the vicinity of the proposed Project are listed as seismogenically active, but the Project is located in Washington State Seismic Design Category B, which is the category representing areas with the lowest relative seismic risk.

A geotechnical investigation completed near the site by Shannon & Wilson, Inc. (2002) indicated that primary specific seismic risks in the lower portion of the proposed Project area are associated with soil liquefaction and lateral spreading. Sediments present within the saturated zone beneath some areas of the site exhibit conditions that are conducive to liquefaction during earthquakes. This liquefaction potential also may contribute to increased chance of lateral spreading of soils during a seismic event. The liquefaction potential of site soils also indicates potential instability of an area near the railroad embankment in the western portion of the smelter area in the event of an earthquake.

6.2 Potential Resource Impacts and Hazards Assessment

Specific conditions related to geology, soils, and groundwater have been studied extensively over the years for ongoing investigation and cleanup of the former CGA smelter site, including those completed for investigations related to a pumped storage project previously proposed at the site by KPUD, and for the preliminary engineering of the proposed Project. An assessment of the potential hazards related to those conditions that could affect or arise from Project construction and operation has been developed using those resources. The following conditions were

evaluated in terms of potential geologic-, soil-, and groundwater-related hazards within and in the vicinity of the Project Boundary:

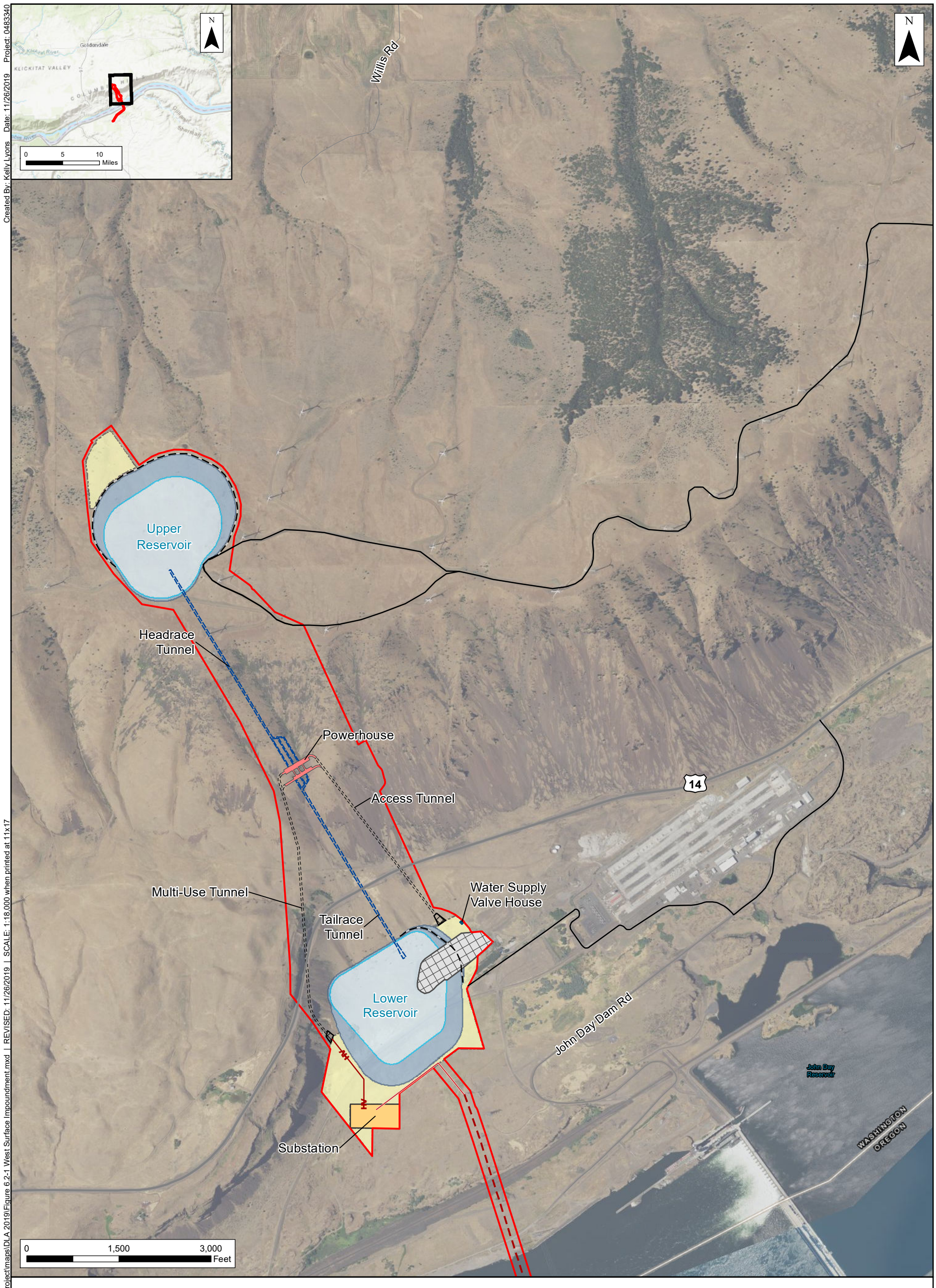
- Former CGA smelter site (WSI);
- Slope stability/mass soil movement;
- Water erosion and windblown dust; and
- Seismicity.

6.2.1 Former Smelter Site

The former CGA smelter generally operated from 1969 to 2003 and generated wastes ranging from sulfur dioxide scrubber wastewater to various metals (particularly fluoride, iron, manganese, and sodium), chlorides, sulfate, cyanide, and phenols. Waste materials were disposed of off-site and on-site. Some on-site wastes (solid and/or liquid) were deposited in landfills (lined and unlined), and some were placed in piles on the ground. Various studies over the years have identified areas of concern. As part of an Agreed Order (May 1, 2014) among Ecology, the current site owner NSC Smelter, and Lockheed Martin Corporation ("Potentially Liable Persons"), a Remedial Investigation and Feasibility Study (RI/FS) was completed in August 2015. The RI/FS characterizes the contamination issues in the area, assesses human and ecological risks, and proposes measures that will be implemented to lower any risks. A supplemental report from the cleanup project consultant (GeoPro, LLC) is scheduled to be submitted to Ecology in early 2019 to address additional data needs (if any) for the RI/FS.

Within the proposed Project Boundary, the lower reservoir is located within the footprint of one of the CGA smelter SWMUs, the WSI (Figure 6.2-1). The WSI was used to concentrate emission control wastewater through evaporation and for storage and disposal of air emission control sludge. In September 2004, the WSI was closed under Resources Conservation and Recovery Act (RCRA; Ecology 2014b). Closure was conducted through consolidation and grading of the sludges and placement of an engineered RCRA cap consisting of a sand layer, a geosynthetic clay layer, 30-mill polyvinyl chloride (PVC) geomembrane liner, a geotextile drainage layer, and soil cover (Ecology 2014a, 2014e). At the time of closure, about 89,000 cubic yards of material was estimated within the WSI. A Closure and Post-Closure Plan was prepared in November 2004, including provisions for long-term maintenance and groundwater monitoring (Parametrix 2004). In November 2005, Ecology accepted certification for WSI closure (Ecology 2014e).

Since the WSI was closed by Ecology, continued monitoring has shown that the material in the impoundment is not designated as hazardous material, and therefore may be removed to a solid waste landfill when construction of the Project commences. The proposed Project design includes removal of all of the WSI material because it is unsuitable for reservoir construction. Additional testing, sampling, and characterization will occur to confirm proper disposal at the time of removal.



Created By: Kelly Lyons Date: 11/26/2019 Project: 0483340

FILE: M:\Projects\Goldendale Energy Storage Project\maps\DLA 2019\Figure 6.2-1 West Surface Impoundment.mxd | REVISED: 11/26/2019 | SCALE: 1:18,000 when printed at 11x17

Legend

- West Surface Impoundment (WSI)
- Project Boundary

Proposed Infrastructure

- Access Road
- High Voltage Cable
- Transmission Line
- Transmission Co-Located with Existing BPA ROW
- Existing Access
- Reservoir
- Reservoir Berm Outer Slope
- Laydown
- Powerhouse
- Substation
- Water Supply Valve House
- Access Tunnel
- Access Tunnel Portal
- Headrace/Tailrace Tunnel

Figure 6.2-1
West Surface Impoundment and Footprint of Lower Reservoir
Draft License Application
Goldendale Energy Storage Project
Goldendale, WA

Environmental Resources Management
www.erm.com
ERM

Source: National Agricultural Imagery Program, July 2017, flown 1m per pixel; NAD 1983 StatePlane Washington South FIPS 4602 Feet

6.2.2 Slope Stability/Mass Movement

Mass wasting events are common on the northern bank of the Columbia River due to deep bedrock instability, especially on the southern limb of the Columbia Hills Anticline. Also, freeze-thaw cycles can cause gradual movement. The Washington Department of Natural Resources (DNR) identifies two situations where landslides commonly occur in the general vicinity of the proposed Project: (1) where weak sedimentary layers between Columbia River Basalt flows cause the overlying basalt to slide along the weak, tilted sedimentary interbeds, and (2) where weathered, tilted, and clay-rich volcaniclastic rocks fail either on their own or beneath overlying younger lava flows, transporting both downslope (USACE 1989).

The Project Boundary is located immediately east of an approximately 700-acre landslide. No landslide features are identified in the Project Boundary by the DNR, nor did DNR identify evidence of potential new major slides in the vicinity of the proposed Project.

General reconnaissance of the John Day (Lake Umatilla) reservoir shoreline indicate that no new major slides have developed in recent years. Large areas of deep bedrock instability are present, likely associated with ancient thrust and normal faulting in the area. Near John Day Dam, Columbia River Basalt flows are disturbed and juxtaposed by the Columbia Hills thrust zone. The zone crosses the Project Boundary at mid-slope elevations. Some of the basalt flows that make up the Wanapum and Grande Ronde Basalt formations within the Project Boundary have discontinuous interbeds of saprolite, tephra, or tuff that reduce slope stability.

In addition to landslides, previous work near the Project identifies extensive talus deposits that form an apron at the base of the basalt cliffs. Talus deposits are composed of rock fragments of any size or shape derived from, and lying at the base of, a cliff or very steep rock slope. Past work has also revealed consolidated debris flow deposits near the Project.

It is unlikely that the Project construction will significantly increase the potential for slope stability and mass movement, and Project designs will take into consideration the potential for naturally occurring events in the Project area.

6.2.3 Water Erosion and Windblown Dust

Erosion hazards not related to slope stability and mass movement processes described above are due to water erosion and windblown dust.

The Project area does not receive much rainfall, which generally minimizes erosion from water sources. However, over long periods these natural processes may potentially result in erosion. Hazards related to water include erosion of soils at both proposed upper and lower reservoirs and loosening of rock and soil in the bluffs above the lower reservoir, causing a potential of gradual or catastrophic movement of rock and soil. Surface and near surface flow can erode soils and weaken rock (such as during freeze thaw cycles).

Windblown dust is caused by introduction of dust into surface water by increased soil erosion during Project construction and operation. Windblown dust accumulation in the reservoirs can cause airborne transport of impacted sediments from the WSI.

Hazards related to windblown dust include reduced air quality, respiration of dust, and transport during construction of the lower reservoir. Windblown dust accumulation in the upper and lower reservoirs was modeled using a dust accumulation model developed by Sehmel (1984). The model output indicated that approximately 104 to 167 pounds of dust per day (19 to 30.4 tons per year) will accumulate in the reservoirs, which equates to a maximum of approximately 0.000763 inch per year across the entire area of the reservoirs.

Accumulation of windblown dust in the reservoirs will not occur at a rate that will require any mitigation beyond standard maintenance to address potential damage to infrastructure. Additionally, the conservative contaminant accumulation scenario indicates that at expected contaminant concentrations and within expected solubility and natural attenuation parameters, it is very unlikely that accumulation of contaminants from windblown dust will significantly affect water quality in the reservoirs.

Management of erosion to prevent surface water and air contamination during Project construction and operation will be outlined in the Storm Water Pollution Prevention Plan and Erosion and Sediment Control Plan to be developed for construction. The Erosion and Sediment Control Plan will address practices to be established during Project construction and operation to minimize the potential for generating windblown dust from Project activities. Special focus in the Erosion and Sediment Control Plan will be given to addressing earthworks in Dallesport and Ewall soils, as well as haploxeroll soils, because these soils have the highest wind erosion risk of the soils on the Project area.

6.2.4 Seismicity

Although located in a relatively low probability risk seismic zone, there is some potential for seismic events in the vicinity of the proposed Project to cause soil liquefaction and lateral spreading. Geotechnical studies will be performed in the next phase of Project engineering design, which will evaluate the seismic hazard and liquefaction and lateral spreading potential. The results of these investigations will be conducted in conjunction with Project design details in preparation for construction. Future Project engineering designs will include measures to ensure safety of Project structures pursuant to FERC Dam Safety protocols.

6.3 Applicant Recommendations

The Applicant will develop plans to address erosion associated with all aspects of Project construction via a Soil Erosion Control Plan. Using BMPs endorsed by the state of Washington, the plan will describe requisite erosion control measures to ensure that impacts are minimized.

Both Washington state law and the federal CWA require National Pollutant Discharge Elimination System permitting for construction activities.

The Applicant will develop a Hazardous Substances Spill Prevention and Cleanup Plan to address potential issues resulting from spills of hazardous substances during construction, operations, or maintenance. Hazardous Substances Spill Prevention and Cleanup Plan will specify materials handling procedures and storage requirements and identify spill cleanup procedures for areas and processes in which spills may occur. The plan will standardize process operations procedures and employee training in an effort to minimize accidental pollutant releases which could contaminate surface or groundwater, or storm water runoff. The Hazardous Substances Spill Prevention and Cleanup Plan will be filed with FERC 1 year after license issuance and will be implemented at the start of construction.

As described in Section 6.2.1 herein, the location of the Lower Reservoir is coincident with the WSI, a CGA smelter SWMU containing non-hazardous waste produced by historical operations of the CGA smelter. The WSI, while non-hazardous, is composed of materials that are unsuitable from an engineering perspective for construction of the Lower Reservoir. The Applicant will negotiate a detailed scope of work and a consent decree with Ecology to govern the removal and off-site disposal of the contents of the WSI, including liner and cover system. The scope of work will be implemented in accordance with the consent order, ensuring that the contents of the WSI are removed from the site and managed in accordance with applicable federal and/or state non-hazardous waste transportation and disposal requirements.

Removal and off-site disposal of the contents and structures associated with the WSI will require decommissioning of eight groundwater monitoring wells historically used for monitoring of the WSI closure and general groundwater conditions in that area of the NSC Smelter, LLC property. The Applicant will retain a licensed well driller to permit, complete, and document the decommissioning. In accordance with state regulations (WAC 173-160), the wells will be decommissioned by means of complete removal of all well materials and grouting in a manner that will seal the well bore and be compatible with the construction requirements for the Lower Reservoir. Subsequent to construction of the Lower Reservoir and ancillary facilities, the Applicant will retain a licensed well driller to install groundwater monitoring wells to replace those required for monitoring of conditions attributable to the CGA smelter site and if/as required for monitoring removal of the WSI. Those replacement monitoring wells will be constructed in accordance with the standards then current.

7.0 RECREATION

The following section discusses recreation in the proposed Project area that may be affected by the proposed Project and associated facilities.

7.1 Existing Recreational Facilities and Use

As the Project will be on private lands, there are no public recreational opportunities in the Project area. Additionally, recreational opportunities in the Project area are limited by past and ongoing industrial uses, including the historical CGA smelter in the lower reservoir area and operational wind turbines in the upper reservoir area.

The nearest recreational opportunities to the Project are associated with scenic travel (State Route 14, which is a scenic highway, and the Columbia River, which is part of the National Historic Lewis and Clark Trail). Other nearby recreation opportunities are associated with the USACE's John Day Dam, and include facilities on both the Oregon and Washington sides of the river. These facilities provide for interpretation, fishing, primitive and electric hookup camping, picnicking, and boating.

Within a 10 mile radius of the Project, most land ownership is private, thus recreation opportunities are relatively limited. There are several parks (i.e., Goldendale Observatory, Goldendale Hatchery, Maryhill State Park, Railroad Island Park, Cliffs Park, LePage Park, and Giles French Park) within a 10 mile radius of the Project. Recreation facilities within 10 miles of the Project area are listed in Table 7.1-1, displayed on Figure 7.1-1, and further discussed in this section.

Table 7.1-1: Recreation Areas within 10 Miles of the Proposed Project Area

Name	Primary Activity	Operator	Distance to the Project (miles)	Comments
SR 14, Lewis and Clark Trail Highway	Viewing scenic, cultural, and historic landscapes	WSDOT	0	Scenic and Recreational Highway
National Historic Lewis and Clark Trail	Viewing scenic, cultural, and historic landscapes	National Park Service	0	Columbia River, no facilities
Cliffs Park, WA	Primitive camping, fishing	USACE	0.25	No fees, 14 day use limit
Railroad Island Park, WA	Boating, picnicking, fishing, wildlife viewing	USACE	0.75	No fees
Giles French/John Day Dam Park, Oregon[1]	Primitive camping, fishing, boating, hiking	USACE	1.0	No fees, 14 day use limit
LePage Park, Oregon	Camping, boating, fishing, beach access	USACE	3.0	Open April 1–October 31, use fees
Philippi Park, Oregon	Boating, camping, beach access, fishing	USACE	5.5	Open May 19–September 30
Maryhill State Park	Camping, picnicking, boating, fishing, water sports, interpretive opportunities	DNR	5.8	Fees, reservations, open year-round
Goldendale Observatory State Park	Astronomy	Washington State Parks	7.4	Fees, closed on holidays
Oregon Trail	Viewing scenic, cultural, and historic landscapes	BLM	7.1	On public roads, no facilities
Goldendale Hatchery	Fishing, hunting, wildlife viewing	WDFW	10.2	Only street parking available

Sources: NPS 2015; NPS 2014a; Oregon State Parks 2014; USACE 2014; DNR 2014a; USACE 2018

BLM = Bureau of Land Management; DNR = Washington Department of Natural Resources; SR = State Route; USACE = U.S. Army Corps of Engineers; WDFW = Washington Department of Fish & Wildlife; WSDOT = Washington State Department of Transportation

Project: 0483340
Date: 11/8/2019
Created By: Kelly Lyons

N

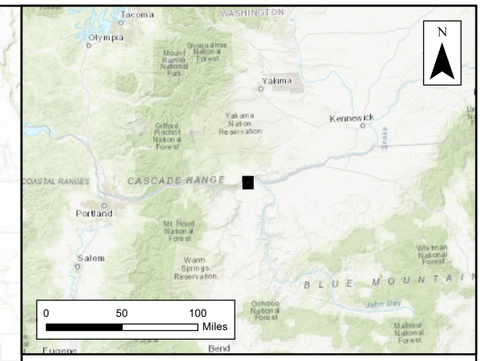
Soda Springs Wildlife Area
Brooks Memorial State Park
Goldendale Trout Hatchery
Goldendale Observatory State Park
Mineral Springs Wildlife Area
Klickitat Wildlife Area
Swale Creek Wildlife Area
Columbia Hills State Park
Gifford Pinchot National Forest
Mount Hood National Forest
Railroad Island Park
Le Page Park
Cliffs Park
Maryhill State Park
Giles French / John Day Dam Park and Visitors Center
Albert Philippi Park
Deschutes River State Recreation Area
Deschutes River State Scenic Waterway
John Day, Hilderbrand
Cottonwood Canyon State Park

MUNSON PRAIRIE
PLEASANT VALLEY
LUNA GULCH
GLASS CANYON
KLICKITAT VALLEY
SWALE CANYON
HORSESHOE BEND
COLUMBIA HILLS
THE BURN
CHIPS HOLLOW CREEK
Goldendale
Centerville
Wasco
Wasco State Airport
Miller Island
Rufus
Swale Creek
Rock Creek
Quarry Creek
Mill Creek
Blockhouse Creek
Little Klickitat River
Chipps Hollow Creek
Columbia River Hwy
Highway 97
Highway 206
Yakama Nation Off-Res Trust Land
Warm Springs Res Forest Land

0 3 6 Miles

Source: Esri - World Topographic Map; NAD 1983 StatePlane Washington South FIPS 4602 Feet

M:\Projects\Goldendale Energy Storage Project\maps\DLA 2019\Figure 7-1 Recreation.mxd



Legend

- Paragliding Location
- Park
- State Hwy 14 - National Scenic Highway

National Historic Trails

- Oregon Trail
- Lewis and Clark Trail
- Wild and Scenic River
- Wild and Scenic Rivers Corridor (BLM)
- Army Corps of Engineers
- WA Dept of Fish and Wildlife
- WA State Parks and Rec. Com.
- WA Dept. of Natural Resources
- Forest Service
- Oregon State Park
- Proposed Project Boundary
- Proposed Project Boundary Vicinity (10 Miles)

Figure 7.1-1
Recreation Facilities Within 10 Miles of the Proposed Project Boundary
Draft License Application
Goldendale Energy Storage Project
Goldendale, WA

Environmental Resources Management
www.erm.com
ERM

7.1.1 Fishing and Hunting

Fishing is available in the Columbia River above and below John Day Dam. The WDFW website lists river access points, as well as, low- and high-elevation lakes for fishing by county. Within 10 miles of the Project area, no river access points or high-elevation lakes are listed, and John Day Reservoir (Lake Umatilla) is listed as a lowland lake with fishing opportunities (WDFW 2015d). WDFW lists typical species fished above the dam, including smallmouth bass, walleye, and other warm water species, as well as sturgeon, steelhead, American shad, and salmon (WDFW 2015d). Fishing is available on the Columbia River below John Day Dam as well, with access provided by USACE's recreational facilities associated with John Day Dam and Maryhill State Park. Additional fishing opportunities occur in the vicinity of the John Day River and Deschutes River, and on other waterbodies accessed via private property.

Hunting is available on public and private lands within 10 miles of the Project area, and generally includes hunting for deer, waterfowl, small game, and game birds. One public hunting area managed by WDFW is within 10 miles of the Project area: a 240-acre wildlife unit adjacent to Goldendale Hatchery that is cultivated under a sharecrop agreement. Natural production of pheasants in District 9 is minimal, but approximately 400 pheasants are released at three sites in Klickitat County each year. The Goldendale Hatchery area is one such site (listed above in Table 7.1-1) approximately 9 miles east of the Project study area. A portion of the wheat produced is left in the fields to supplement upland game birds, and pen-reared pheasants are released for fall hunting. This area is also used for waterfowl hunting and trout fishing. Other hunting opportunities may exist on Bureau of Land Management (BLM) land in the areas surrounding the proposed Project footprint.

7.1.2 Boating and Watersports

As indicated in Table 7.1-1, plentiful boating opportunities are associated with the Columbia River near the proposed Project area. Opportunities for boating and water sports in the Project vicinity are mainly associated with the Columbia, John Day, and Deschutes Rivers. On the Columbia River, many of the recreational facilities associated with John Day Dam, as well as Maryhill State Park, provide boat launch and/or mooring facilities to facilitate fishing, boating, and various other water sports such as water skiing and sailboarding.

7.1.3 Astronomy

Goldendale Observatory State Park is located approximately 5 miles northwest of the proposed Project area and is situated on a 2,100-foot-elevation hilltop. This 5-acre facility is a certified Dark Sky Park and offers educational opportunities for viewing astronomical events. The interpretive center also offers programs about telescopes and star-gazing (Washington State Parks 2014b).

7.1.4 Paragliding

A private paragliding launch site, called "Cliffside Launch," is in the vicinity of the Project (shown on Figure 7.1-1). Private paragliders launching from this location will not land in the Project Boundary. The Applicant met with Kelly Kellar, the President of the Cascades Paragliding Association, in December of 2018 to better understand paragliders use of the Cliffside Launch. The Project as proposed will not interfere with the use of Cliffside Launch, nor will it interfere with local flyers. A summary of the correspondence is included in Appendix F.

7.1.5 Wild and Scenic Rivers

The John Day River's confluence with the Columbia River is less than 3 miles up-river from the John Day Dam, in Oregon, southeast from the proposed Project area. The John Day River system has designations under two river preservation programs: the National Wild and Scenic Rivers Act and the Oregon Scenic Rivers Act. Recreation activities on the John Day River and in the surrounding area include fishing, boating, swimming, hiking, and camping. This river is nationally known for its smallmouth bass and steelhead fishery (BLM 2014c).

The Deschutes River, also located in Oregon, is approximately 10 miles southwest of the proposed Project area. Upstream of the Project vicinity, the Lower Deschutes River is designated as a Wild and Scenic River, and the Deschutes River State Recreation Area offers visitors numerous opportunities for camping, hiking, horseback riding, wildlife viewing, and fishing. In addition, the river drops a quarter mile in elevation in its final 100 miles, which makes it a popular destination for those interested in whitewater rafting, kayaking, and inner-tubing (Oregon State Parks 2014).

The Klickitat River in Washington, also a Wild and Scenic River, is more than 10 miles away from the Project area. The Klickitat River's confluence with the Columbia River is approximately 28 miles downriver (west) of the Project area.

7.1.6 Designated Wilderness

No area within the Project Boundary has been designated as wilderness under the Wilderness Act (University of Montana 2019). The closest designated wilderness areas to the Project are the Badger Creek Wilderness, approximately 45 miles to the southwest, and the Mark O Hatfield Wilderness, approximately 50 miles west (University of Montana 2019).

7.1.7 National Historic Trails

The Oregon Trail is designated as a National Historic Trail (NHT) by the NPS. At its nearest distance from the proposed Project area, the Oregon Trail is approximately 7 miles away. Within this area, the trail generally runs east-west within privately owned agricultural lands south of the

Columbia River in Oregon. At various points along the trail, visitors can learn about the history and culture of early American settlers that used the trail on their trek west (NPS 2014a).

The Lewis and Clark Trail consists of a loosely defined route along the Columbia River just south of the proposed Project area (NPS 2015). This trail was designated as an NHT by Congress as part of the national trails system in 1978. In total, 330 miles of the 3,700-mile, multi-state route are managed as part of BLM's National Conservation Lands. The portion of the trail near the proposed Project area is managed by BLM (BLM 2014d). The Lewis and Clark Trail is not generally defined by physical trail remains. The only tangible elements of the Lewis and Clark Trail near the proposed Project area are defined by the Columbia River and river banks that the Lewis and Clark route followed. As such, agencies that work together to support the trail, including the NPS, attempt to provide recreationists with the historic setting of this route along the river way—comparable to the natural descriptions found in expedition journals.

7.1.8 State Scenic and Recreational Highway

State Route 14 (Lewis and Clark Trail Highway) is designated by the State of Washington as a Scenic and Recreational Highway. This designation reflects the importance of the scenic, cultural, and historic landscapes along this route as it relates to Lewis and Clark's trek along the Columbia River (WSDOT 2014). The highway crosses the Project footprint between the proposed upper and lower reservoirs.

7.1.9 National Forest Land

A portion of the 1,312,000-acre Gifford Pinchot National Forest is located approximately 8 miles southwest of the proposed Project area. This National Forest land offers a variety of opportunities for wildlife viewing, hiking, boating, camping, fishing, and hunting, among others (USFS 2014).

7.1.10 Other Federal and State Lands

Additional developed recreation facilities near the proposed Project area consist of various federally or state owned and operated parks (see Table 7.1-1). The primary recreational activities associated with these areas consist of camping, picnicking, boating, and fishing. Among these facilities, Maryhill State Park and Goldendale Observatory State Park offer some unique recreation opportunities.

Maryhill State Park, approximately 5 miles southwest of the proposed Project area, is a 99-acre camping park with 4,700 feet of waterfront on the Columbia River. Along with opportunities for picnicking, boating, fishing, and various other water sports, the area also provides interpretive opportunities with an art museum and a full-scale replica of Stonehenge in Wiltshire, England (Washington State Parks 2014a). Camping is also available at the USACE's recreational facilities at John Day Dam within 1 mile of the Project area.

Goldendale Observatory State Park is located approximately 5 miles northwest of the proposed Project area and is situated on a 2,100-foot-elevation hilltop. This 5-acre facility is a certified Dark Sky Park and offers educational opportunities for viewing astronomical events. The interpretive center also offers programs about telescopes and star-gazing (Washington State Parks 2014b).

7.2 Potential Recreation Resource Impacts

The Applicant's objectives are to minimize disturbances to and protect recreational resources in the proposed Project area. Construction timing and methods will be planned in accordance with these objectives to the extent practicable. The Applicant will work closely with federal, state, and local agencies to ensure that construction activities and facility operation are in accordance with these objectives. In cases where temporary disturbance to identified recreational resources are significant and unavoidable, mitigation measures will be identified and implemented to reduce significant effects. If needed, recreation management measures will be developed and included in a Visual and Recreation Resource Management Plan (VRRMP), which will be provided as a component of the license application.

As public recreation facilities are not available inside the Project area, there will be no impacts to existing or future recreation inside the Project area during construction or operations. Furthermore, public access will not be provided to the Project area during construction and operations.

Impacts to recreation in the Project vicinity will be limited to construction traffic delays or noise affecting traveling recreationists due to Project use of public roads. The nearest recreational facility to the Project is USACE's Cliffs Park, a fishing access site with vault toilets and 14-day use permitted (primitive camping). The most direct vehicle access to the park is via John Day Dam Road between mileposts 108 and 109, which travels through the Project area. The increased use of John Day Dam Road by construction vehicles could temporarily impact recreation users and create travel delays or disturbances.

Additionally, recreational traffic on State Route 14, a scenic highway, could experience travel delays or disturbances during construction. Construction activities will cause moderate visual effects to observers from U.S. Route 97, U.S. Route 14, and Interstate 84. These visual effects are further discussed in Section 8.0, Aesthetics. Traffic during operations will not be at a level to impact other travelers.

All other existing recreation sites are several miles from the proposed Project area and, as a result, temporary or intermittent indirect impacts are expected to be minimal.

7.3 Applicant Recommendations

Due to the location of the Project on a former industrial facility, the nature of Project operations, and the lack of access to the public, there is little opportunity for developing new recreation facilities. Also, there is little or no existing recreation in the Project vicinity that will be impacted by the proposed Project.

The Applicant aims to reduce the potential recreation impacts of the Project and maintain the surrounding quality of the landscape. The Project's location within an EOZ is intentional and provides that the Project will be consistent with adjacent land use and intended use of the site.

An interpretive sign will be placed in an area near the Project that is accessible to the public and from where the Project can be viewed. The interpretive sign will be handicapped accessible. The interpretive sign will display a map of the Project and provide information on pumped storage. Subject to further consultation with USACE, the interpretive sign could be placed on USACE-managed recreation lands in the proximity of the Project.

The Applicant will coordinate construction schedules and any associated road closures with Washington State Department of Transportation (WSDOT) and Klickitat County in order to prevent interruption to recreational traffic. Further, access to and from the construction site will be closed to the public.

A fencing plan and/or a public health and safety plan will be developed to protect public health and safety, safeguard the security of the hydropower generating facility, and prevent wildlife from entering the Project reservoirs and other features and becoming entrained or otherwise harmed. All of these objectives will be addressed together in this plan to provide a coherent presentation of the Applicant's plans for fencing and other restraints that will control public and wildlife access to the Project area. This plan will include the following components:

- Fencing around Project components;
- Signs warning the public of high voltage and other hazards, placed on the appropriate fence locations; and

Locked gates and/or rock barricades that may be installed to limit vehicle access by recreational users.

8.0 AESTHETICS

8.1 Existing Environment

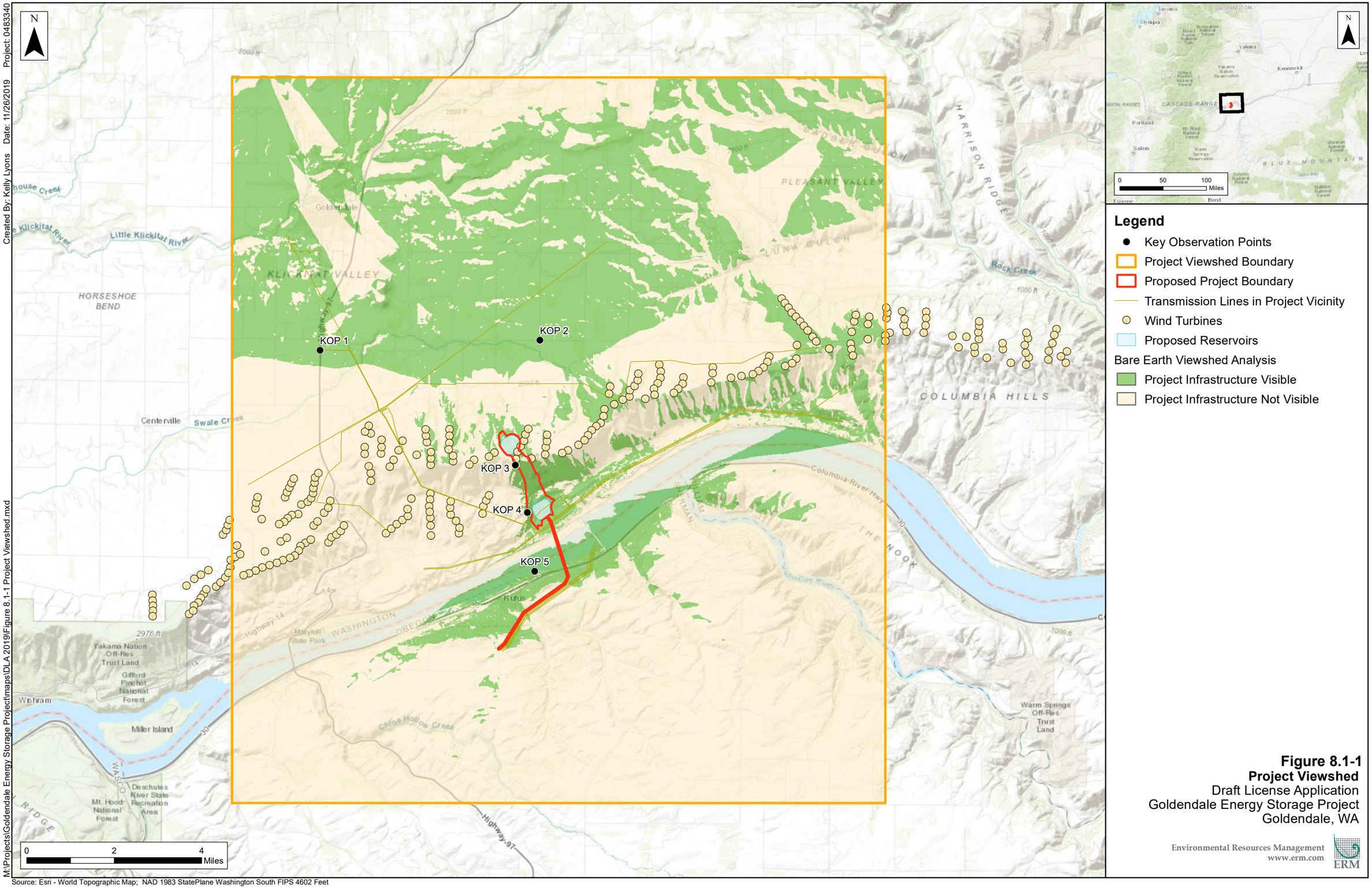
The study area for visual resources extends beyond the proposed FERC Project Boundary into the Project vicinity, and encompasses the Project's topographic viewshed from which the Project is potentially viewable from publically accessible areas.

The proposed Project Boundary and vicinity consists of the rolling terraces and rangeland in the hills above the Columbia River. The upper and lower reservoir areas have distinctly different visual settings. In the vicinity of the lower reservoir, the visual setting is dominated by current and historic industrial activities related to John Day Dam, BPA rights-of-way, and the former CGA smelter. The vicinity of the area associated with the upper reservoir is a mix of large areas of grasslands interspersed with wind turbine generators and an associated road network, as well as limited areas of oak woodlands. Photographs of the Project area are included in a Photo Log (Photos 1 through 6) included as Attachment 2 to this Exhibit.

The viewshed of the Project area encompasses approximately 158,500 acres as shown on Figure 8.1-1. The Project study area spans multiple sections within Township T3 North, Range R17 East on the Rufus USGS 7.5-minute quadrangle map. The upper reservoir and appurtenant features will be located on the Columbia Hills adjacent to a high desert plateau approximately 2,500 feet above the Columbia River (upper plateau). The lower reservoir, underground powerhouse, access tunnel portal, and appurtenant features will be located on a former flood plain plateau 580 feet above the Columbia River (lower plateau). Additional information about the proposed Project features is included in Exhibit A.

Created By: Kelly Lyons Date: 11/26/2019 Project: 0483340

M:\Projects\Goldendale Energy Storage Project\maps\DLA 2019\Figure 8.1-1 Project Viewshed.mxd



Legend

- Key Observation Points
- Project Viewshed Boundary
- Proposed Project Boundary
- Transmission Lines in Project Vicinity
- Wind Turbines
- Proposed Reservoirs

Bare Earth Viewshed Analysis

- Project Infrastructure Visible
- Project Infrastructure Not Visible

Source: Esri - World Topographic Map; NAD 1983 StatePlane Washington South FIPS 4602 Feet

Figure 8.1-1
Project Viewshed
Draft License Application
Goldendale Energy Storage Project
Goldendale, WA

Environmental Resources Management
www.erm.com

8.2 Visual Resource Assessment Overview

A visual resource assessment that includes a review of the visual resources inventory process and a preliminary assessment of the visual impact of the proposed Project location was conducted in 2019. The features assessed included the proposed locations of upper and lower reservoirs, a buried powerhouse, tunnel portals, an aboveground substation, and transmission lines. Although no prescribed methodologies for assessing visual resources exists for the proposed Project location, the assessment was conducted in accordance with the BLM Visual Resource Management (VRM) Inventory and Contrast Rating System. A detailed description of the methodology is included in the Aesthetics Resources Study Report (Appendix J).

Long-term visual resources impacts are anticipated where portions of the Project infrastructure and features are visible from communities or residences, from recreation areas, or from culturally significant or sensitive viewpoints. Potential short-term construction and longer-term operation impacts from the Project include:

- Visibility from communities and individual residences;
- Visibility from recreation areas, preservation areas, and parks;
- Visibility from culturally significant sites;
- Visibility from transportation corridors;
- VRM impacts/compatibility with visual management designations; and
- Scenic or aesthetic quality impacts to the surrounding landscape.

Project infrastructure and features have the potential to alter the visual characteristics of the local landscape. Specifically, six groups of observers have been identified that could be affected by Project construction and operation:

- Motorists on State Route 14;
- Motorists on Interstate 84;
- Motorists on U.S. Route 97;
- Motorists on Hoctor Road;
- Residents and landowners within the viewshed of the Project; and
- Temporary visitors to areas near or adjacent to the Project, including John Day Dam.

8.3 Visual Resource Baseline Information

8.3.1 Regional Setting

The Project visual resources study area contains many existing human modifications, including rural residences and communities, agricultural fields and structures, highways and other roads, substations, transmission lines, wind turbines, and a large hydroelectric dam. Communities within a few miles of the Project viewshed include Rufus, Oregon (population 249), and Goldendale, Washington (population 3,485) (U.S. Census Bureau 2018). The majority of the Project viewshed is privately owned by individuals and NSC Smelter, and it is characterized by wind farms, agricultural activities including irrigated crops, and range land used for grazing (U.S. Census Bureau 2010). The proposed lower reservoir is located within historic CGA smelter lands, which are characterized by extensive modification and industrial development.

8.3.2 Landscape Character Types

The aesthetics study included a review of landforms in the study area via aerial photographs, topographic maps, and field visits. These landforms were then categorized into landscape character types. Landscape character is defined as the distinct, constant, and identifiable configuration of elements in a landscape that make one landscape differ from another. These configurations of elements can be natural (e.g., landform, soil type, waterbodies) or manmade (e.g., cities and rural communities).

The aesthetic character of the lands that will be directly affected by the Project (both the previous and current Project proposal) is currently made up of the following landscape character types: river valley landscape, plateau, waterbody, and developed area. See Photographs 1 through 6 in Attachment 2 to this Exhibit for examples of each landscape character type.

8.3.3 Key Observation Points—Existing Character

As described in more detail in the Aesthetics Resources Study Report (Appendix J of this DLA), a total of five key observation points (KOPs) were selected from a list of potential vantage points along roadways and accessible locations with public and private access within the study Project viewshed. KOPs were selected based on criteria consisting primarily of the level of traffic, angle of view, distance, and duration for those areas with representative views of Project infrastructure and features within the Project viewshed.

KOP locations were selected based on the following criteria:

- The location provides the most representative view of the Project for a given area and portion of the Project;
- The location provides the greatest potential number of receptors (i.e., potential viewers) that will be able to actually see the Project;

- The location is a relatively common and/or sensitive view within the study area that could be affected by the Project; and
- It is a relatively good location that can be used to measure anticipated change in visual resources resulting from the Project.

KOP locations differ by landscape analysis factors (i.e., distance from the Project, predominant angle of observation, dominant use, duration of view, and common or sensitive receptors).

Existing conditions at each KOP are shown in Attachment 2, Photos 6 through 11, and in the photomontages in Attachment 4. BLM VRM datasheets were completed at each KOP.

8.3.3.1 KOP 1

KOP 1 is located in a grassy median west of the intersection of Hoctor Road and U.S. Route 97 near Goldendale, Washington (Attachment 2, Photo 7). This KOP was selected because it represents potential views of the upper reservoir available to the public from a segment of the heavily travelled U.S. Route 97 (traffic count of 5,297 vehicles per day; WSDOT 2016) south of Goldendale at the intersection of Hoctor Road. The landscape consists of a flat plateau and rolling/undulating Columbia Hills to the south. Irrigated agricultural fields dominate the foreground in the immediate area, with grassland, shrub steppe, and oak woodlands dominating middle-ground along the hills near the Project. The land in the immediate vicinity of this KOP is predominantly private land on either side of U.S. Route 97. Human activity visible from the KOP includes agriculture, wind farms, and a major transportation corridor. Existing visible structures include wind turbines, power poles, transmission lines, Old Highway 97, U.S. Route 97, Hoctor Road, a small Northwest Pipeline Corporation facility, and residential structures including farm houses and barns. No VRM Class has been designated by the BLM for lands within the vicinity of KOP 1.

8.3.3.2 KOP 2

KOP 2 is located southeast of Goldendale along the side of road at the intersection of Willis Road and Hoctor Road facing south (Attachment 2, Photo 8). This KOP was selected because it represents potentially prominent views of the location for the upper reservoir for residents and the general public that travel along Hoctor Road. Views of the landscape at this location are primarily the rolling/undulating Columbia Hills, with the beginning of a flat plateau adjacent and to the south of KOP 2. Land use visible from KOP 2 includes primarily privately owned farmlands used for agricultural and power generation from wind turbines. Irrigated agricultural fields dominate the area adjacent to the KOP, and the hills in the foreground are vegetated by grassland, shrub steppe, and western juniper and ponderosa pine woodlands. Existing visible structures from this KOP include wind turbines, power poles, transmission lines, irrigation lines, Hoctor Road, Willis Road, and residential structures including farm houses and barns. No VRM Class has been designated by the BLM for lands within the vicinity of KOP 2.

8.3.3.3 KOP 3

KOP 3 is located at the top of the Columbia Hills at Juniper Point adjacent to the location of the Upper Reservoir looking downslope to the south at the proposed location of the lower reservoir (Attachment 2, Photo 9). The KOP is located approximately 300 feet on the downslope side from the radio tower. The KOP is on NSC Smelter property and is currently not accessible to the general public. This location was selected because it provides a good vantage point overlooking the proposed location of the lower reservoir from Juniper Point, which has been identified as a sensitive cultural location for Indian tribes in the area (see DLA Section 4.0). At an elevation of 3,000 feet AMSL, the location of the KOP is approximately 2,500 feet higher than the site for the lower reservoir. The landscape consists of the Columbia Gorge with a view of the Columbia River below basalt cliffs, the mouth of the John Day River, and an expansive plateau spreading out above the river. Land use includes a mixture of publicly managed land (BLM, DNR, USACE, and WSDOT) and privately owned land (NSC Smelter and individual properties), as well as agricultural lands on the flat plateau. Existing visible structures include the town of Rufus, The John Day Dam, Interstate 84, State Route 14, the former CGA smelter, wind turbines, and transmission lines. No VRM Class has been designated by the BLM for lands within the vicinity of KOP 3.

8.3.3.4 KOP 4

KOP 4 is located on a gravel pullout adjacent to the lower reservoir near the southeast side of State Route 14 above the proposed location of the lower reservoir (Attachment 2, Photo 10). The location is on public land associated with State Route 14. It was selected for the ease of public access, close proximity to the Project, and for cultural significance of the Lewis and Clark Trail Highway and as a Scenic and Recreational Highway. KOP 4 provides a close-up vantage point for the scale and size of the Project facilities associated with the lower reservoir and powerhouse. The landscape consists of talus slopes associated with the Columbia Hills to the east, basalt cliffs that abruptly transition into the Columbia River to the South, and the flat floodplain adjacent to the river. Land use in the surrounding area consists of a mixture of private NSC Smelter and individual properties) and publicly managed land (BLM, USACE, and WSDOT) currently used for power generation, transportation, and recreation, with evidence of historic industrial use associated with the former CGA smelter. Existing visible structures at this location include State Route 14 and Interstate 84, the former CGA smelter, the John Day Dam, transmission lines, wind turbines, railroad tracks, campers and other evidence of recreational use by the public along the bank of the river. No VRM Class has been designated by the BLM for lands within the vicinity of KOP 4.

8.3.3.5 KOP 5

KOP 5 is located near the town of Rufus along the bank of the Columbia River in Giles French/John Day Dam Park facing north across the river toward the lower plateau and the

location of the lower reservoir (Attachment 2, Photo 11). This location was selected because it is publically accessible and it represents the views from the public park along the banks of the Columbia River as well as similar views from the town of Rufus and Interstate 84. The landscape consists of large talus slopes associated with the Columbia Hills on the north side of the Columbia River and prominent basalt cliffs that abruptly transition into the Columbia River. The surrounding land use consists of a mixture of private NSC Smelter and individual properties) and publicly managed land (BLM, DNR, USACE, and WSDOT) currently used for power generation, transportation, and recreation, with some evidence of historic industrial use associated with the former CGA smelter. Existing visible structures include commercial and residential buildings in the town of Rufus, Interstate 84 and State Route 14, the John Day Dam, transmission lines, structures associated with the former CGA smelter, wind turbines, and campers along with other evidence of recreation on both banks of the river. No VRM Class has been designated by the BLM for lands within the vicinity of KOP 5.

8.4 Potential Visual Impacts

Project infrastructure and features have the potential to alter the visual characteristics of the existing landscape within the vicinity of the Project, as described in Section 8.4.2, but will be consistent with development in the area.

Project components that will be visible once construction is completed include:

- Upper reservoir;
- Lower reservoir;
- Substation; and
- 230-kilovolt transmission line between the Project substation and BPA John Day substation.

Both the penstock and powerhouse will be located underground, which will reduce the visual impact on the surrounding area.

8.4.1 Viewshed Analysis

A viewshed analysis is included in the Aesthetics Resources Study Report (Appendix J) to determine sensitive viewing areas where Project features may be visible. Culturally significant and/or sensitive areas were field-verified by professionals with experience completing hydropower viewshed analyses to determine if Project features in the previous project design could actually be viewed from these locations.

Visibility of the Project infrastructure and features on the lower plateau extend east and west along both the north and south banks of the Columbia River. The viewshed analysis and KOP locations are shown in Figure 8.1-1.

8.4.2 Construction Impacts

Visual impacts that are the direct result of construction of the Project are considered temporary, will be restored to pre-existing conditions where practicable, and will include the application of mitigation measures planned to reduce impacts to the visual aesthetic landscape both during construction of the Project and following construction activities where necessary.

During construction, equipment such as large trucks, drilling and grading equipment, and craneswill be present in the Project area. Construction activities, including clearing, grading, and staging of Project areas, are all considered to be short-term impacts to visual resources. Staging and construction areas may need temporary construction lighting supplied by light buggies or trailers.

Temporary visual impacts will include any construction laydown areas and increased clutter and activity during Project construction. The first will be located immediately adjacent to the northwest corner of the upper reservoir on the upper plateau, and the second will be located immediately adjacent to the southwest corner of the lower reservoir on the lower plateau. Temporary visual impacts on the upper and lower plateaus will be minimal due to the natural topography, viewing distances, and the visual impacts of existing land use.

8.4.3 Operations and Maintenance Impacts

The permanent Project features will be visible within the Project viewshed given the large mass of the reservoirs. Views of these Project features cannot be completely avoided due to their large size and the open landscape of the Project area. However, several of the Project features will be underground, so no visual impacts will occur for these (e.g., powerhouse, tunnels, and penstock).

Impacts from the proposed Project on the selected KOPs were determined through field visits, completing the visual contrast rating worksheets (Attachment 3), and completing photograph simulations (Attachment 4). Lighting will be required at some Project features; the Applicant will seek to reduce Project exterior lighting to protect the currently dark night sky from light pollution.

The sections below discuss the results of the scenic quality and visual contrast rating evaluation, including a description of visible Project features and the visual impact rating for each KOP. Additional information regarding the scoring and evaluation of each KOP are presented in additional detail in the Aesthetics Resources Study Report, which is included as Appendix J to this DLA. A contrast rating described in the methodology in Appendix J was assigned for each KOP as weak (0 to 7), moderate (8 to 16), and strong (17 to 20). Photomontages for each KOP showing how proposed Project features are situated within each landscape are included Attachment 4.

8.4.3.1 KOP 1

KOP 1 (Attachment 4, Figure A-1) received a scenic quality score of 13 and a B ranking, meaning that the landscape is of above-average diversity of interest. The east face of the Project's upper reservoir will be approximately 5 miles southwest from the viewpoint. The reservoir berm will appear as a small tan-brown mass along the top of the gently rolling ridge, creating a horizon line that blends with the ridge. Because of the distance from the viewpoint and the subtle form of the reservoir wall, the contrast rating score for this site was 1 (weak contrast). Besides revegetation management of temporarily disturbed areas, no further mitigation is proposed.

8.4.3.2 KOP 2

KOP 2 (Attachment 4, Figure A-2) received a scenic quality score of 8 and a C ranking, meaning that the landscape is primarily common to the region and offers minimal diversity and distinguishing characteristics. The reservoir berm will appear as a brown mass along the top of the gently rolling ridge, creating a horizon line that blends in with the ridge approximately 2 miles from the viewpoint. Due to the distance of the reservoir berm and the similarity of the berm to the existing ridgetop, the contrast rating for the site was 1 (weak). Besides revegetation management of disturbed areas, no further mitigation is proposed.

8.4.3.3 KOP 3

KOP 3 (Attachment 4, Figure A-3) received a scenic quality score of 16 and a B ranking, meaning that the landscape is of above-average diversity of interest. The Project's lower reservoir, substation, and transmission line will be visible to the south approximately 1 mile from the viewpoint, in a vista that includes the Columbia River, the John Day Dam, locks, the BPA transmission line, and the former CGA smelter in a landscape of a steep rocky cliff and rolling hills. Due to the size of the reservoir, the visual contrast rating is 2 (moderate) where contrast starts to attract attention to the viewer and starts to dominate the landscape character. The proposed Project is consistent with existing development in the area, and no further mitigation is proposed except for revegetation management of disturbed areas.

8.4.3.4 KOP 4

KOP 4 (Attachment 4, Figure A-4) received a scenic quality score of 13 and a B ranking, meaning that the landscape is of above-average diversity of interest. The Project's lower reservoir is prominent in the views foreground while the substation, and transmission line will be visible to the south and east approximately 0.13 mile in the middle ground and background. The overall vista includes the Columbia River, the John Day Dam, locks, the BPA transmission line, and the former CGA smelter in a landscape of a steep rocky cliff and rolling hills. Due to the prominence of the lower reservoir, the visual contrast rating is 3 (strong) where contrast attracts attention to the viewer and dominates the landscape character. The proposed Project is consistent

with existing development because of the dominance of industrial development (NSC Smelter) in the area. Besides revegetation management of temporarily disturbed areas, no further mitigation is proposed.

8.4.3.5 KOP 5

KOP 5 (Attachment 4, Figure A-5) received a scenic quality score of 17 and a B ranking, meaning that the landscape is of above-average diversity of interest. The reservoir berm will appear as a short and wide brown mass tucked in among the cliffs of the steep slope between the upper and lower reservoir, creating a horizon line that blends with other ridges slopes nearby approximately 1.2 miles from the viewpoint. Because of the distance from the viewpoint and the subtle form of the reservoir wall, the contrast rating score for this site was 2 (weak). Besides revegetation management of temporarily disturbed areas, no further mitigation is proposed.

8.5 Applicant Recommendations

The Applicant aims to minimize the potential visual impacts of the Project and maintain the surrounding aesthetic quality of the landscape. Major Project features are located in areas with existing industrial infrastructure, but efforts will be taken to mitigate visual impacts. The Project design is preliminary and will consider the need to include engineering controls and mitigation measures to blend in with current visual elements in the area and reduce visual impacts from the Project. The amount of modification upon visual resources is dependent upon the blending of Project features with existing landscape features within the Project viewshed. The Applicant will work with agencies and stakeholders to minimize visual impacts through the refinement and design of Project features.

Proposed PM&E measures to reduce visual impacts include the following:

- Engineering controls will be included during the design process, where practicable, to reduce contrasts visible between the existing landscape and the proposed Project from sensitive viewing areas.
- Minimize footprints or aboveground features to the furthest extent reasonably practicable.
- Ensure facilities are free of debris and store unused or damaged equipment offsite pursuant to the requirements of Klickitat County's EOZ. During construction, the Applicant will monitor the Project area for construction-related debris. Where practical, designated locations will be established for the temporary storage of debris from construction.
- Reduce contrast through natural paint colors and surfacing materials that match the surrounding landscape and dulling reflective surfaces that cannot be painted.
- Native vegetation and/or trees could be planted to break up the lines of roads and facilities and soften the visual effect on the landscape.

- Design, install, and maintain facility lighting to prevent casting of light into adjacent native habitat. Incorporate directional lighting; light hoods, low-pressure sodium bulbs, or light emitting diode (LED) lighting; and operational devices in final design to allow surface night-lighting in the central Project area to be turned on as needed for safety.
- Install fully shielded low-pressure sodium lighting to reduce lighting impacts to protect the current dark sky conditions from light pollution.

Reduce lighting to the extent possible through the use of lamp types, covers, timers, motion sensors, or other means. Class II lamp source and shielding requirements will be used where outdoor lighting is necessary.

9.0 LAND USE AND COMPREHENSIVE PLANS

This section provides a report on the existing uses of Proposed Project lands and adjacent property, and those land uses that would occur when the Project is constructed.

9.1 Existing Land Uses & Management

The closest town is Goldendale, Washington, located in Klickitat County, approximately 8 miles northwest of the Project area. Goldendale has an estimated population of 3,485 residents (U.S. Census Bureau 2018). The next closest town is The Dalles, Oregon, approximately 21 miles southwest and in Wasco County, which had a 2017 population of 15,646 residents (U.S. Census Bureau 2018).

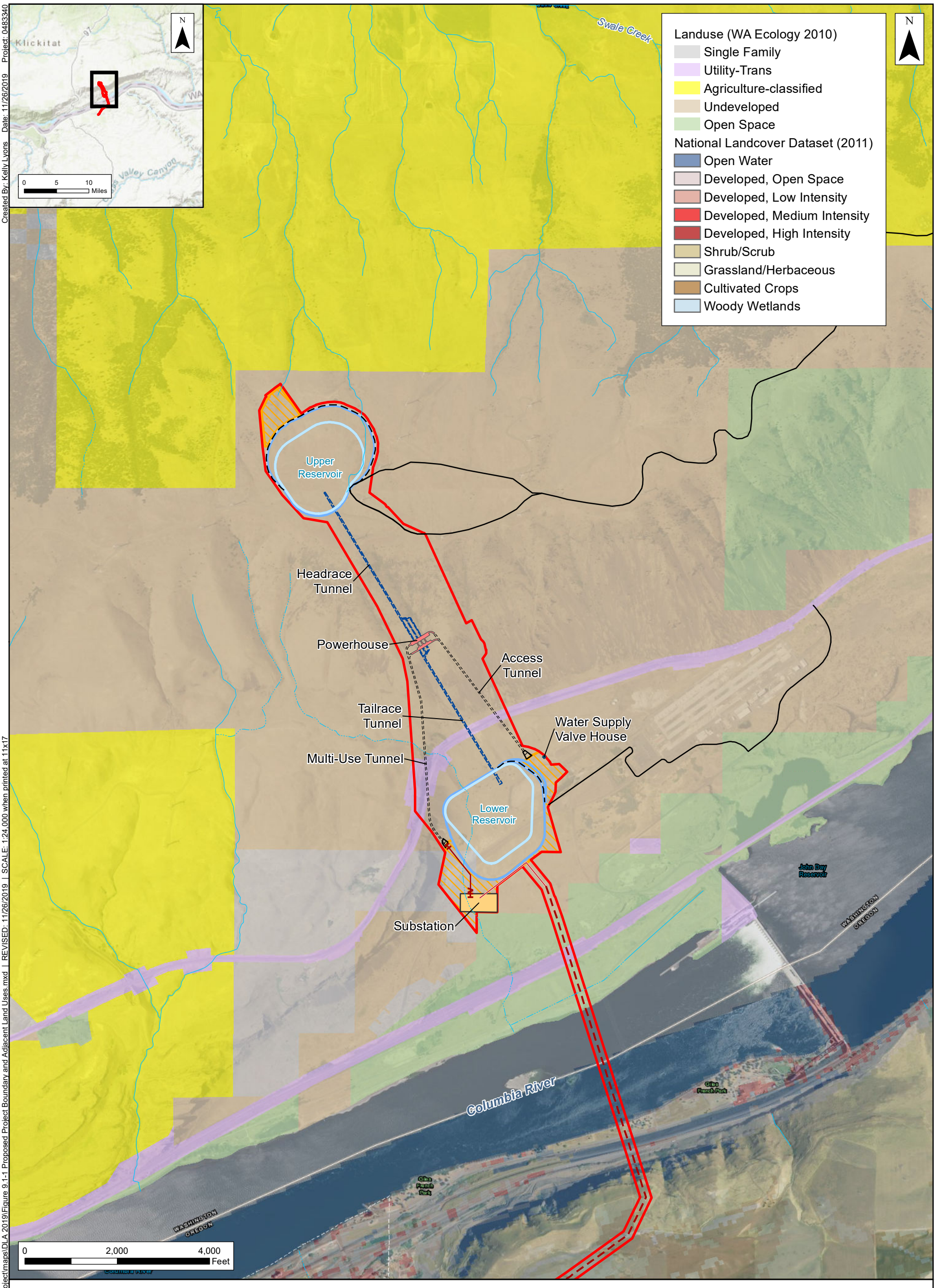
The upper reservoir vicinity includes wind farms and dry-land agriculture/rangeland. A wind farm is located just east of and adjacent to the proposed Project Boundary and consists of 13 wind turbines owned by Tuolumne Wind Project Authority. These wind turbines are part of the Windy Point Phase I Project, which is comprised of 62 wind turbines (Ecology and Environment, Inc. 2006).

The lower reservoir area was previously occupied by the CGA smelter (currently owned by NSC Smelter). Following construction and operation of hydroelectric dams within the Middle Columbia Basin, construction for the CGA smelter began in 1969 near the present day John Day Dam. The site operated as an aluminum smelter from 1971 to 2003 under various owners, the most current being NSC Smelter. The former smelter and its relationship to the proposed Project are discussed in more detail in Section 6.0, Geology and Soils. The lower reservoir vicinity includes the remainder of the CGA smelter lands, Washington State Highway 14, and the Columbia River.

Land cover in the watersheds include cropland, pastureland, orchards and vineyards, rangeland, and forest land. The majority of the irrigated orchards and pastures in these watersheds are located downstream of the John Day River in the Hood River Valley and The Dalles. Major agricultural commodities include wheat, barley, cattle, hay, pears, apples, and cherries. The

NRCS estimated that approximately 5 percent of the Middle Columbia-Hood River Watershed is used for irrigated agriculture (a total of 37,600 acres of irrigated lands in 1997 [NRCS 2005]).

The proposed Project Boundary and land uses within the proposed boundary and immediate vicinity are shown in Figure 9.1-1.



Legend

- Project Boundary
- Proposed Infrastructure
  - Access Road
  - High Voltage Cable
  - Transmission Line
  - Transmission Co-Located with Existing BPA ROW
  - Existing Access Road
  - Reservoir
  - Reservoir Berm Outer Slope
  - Laydown Area
  - Powerhouse
  - Substation
  - Water Supply Valve House
  - Access Tunnel
  - Access Tunnel Portal
  - Headrace/Tailrace Tunnel

Figure 9.1-1
Proposed Project Boundary and Adjacent Land Uses
Draft License Application
Goldendale Energy Storage Project
Goldendale, WA

Environmental Resources Management
www.erm.com

Source: National Agricultural Imagery Program, July 2017, flown 1m per pixel; NAD 1983 StatePlane Washington South FIPS 4602 Feet

Created By: Kelly Lyons Date: 11/26/2019 Project: 0483340

FILE: M:\Projects\Goldendale Energy Storage Project\maps\DLA 2019\Figure 9.1-1 Proposed Project Boundary and Adjacent Land Uses.mxd | REVISED: 11/26/2019 | SCALE: 1:24,000 when printed at 11x17

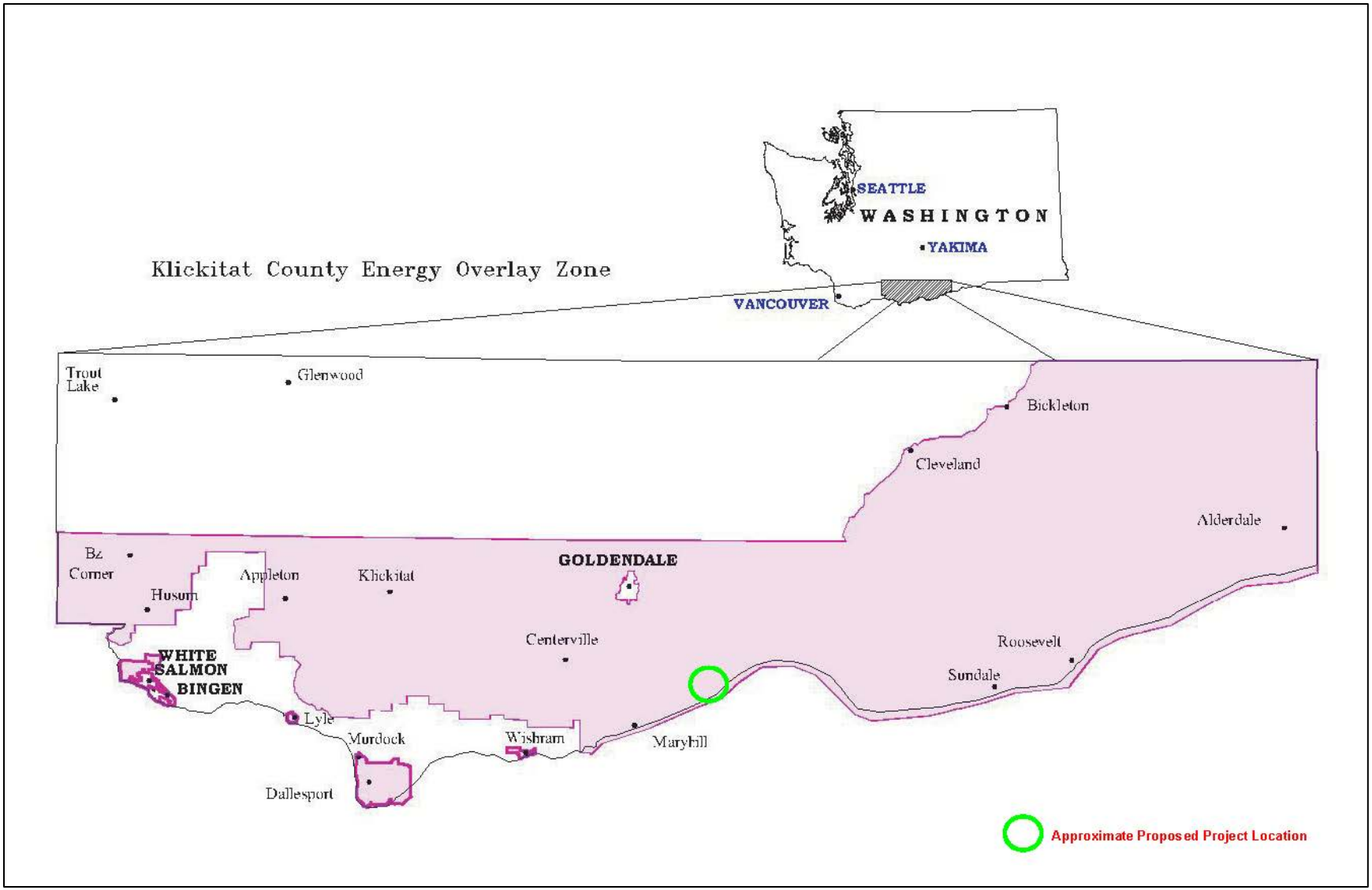
9.1.1 Zoning

Lands within in the proposed Project area boundary are primarily privately owned; however, USACE and WSDOT also own land within the Project Boundary (Exhibit A, Section 1.1). Planning, zoning, land use, and development are regulated by the Klickitat County Code (Klickitat County 2013). Three different zoning types exist within the proposed Project Boundary.

The proposed transmission line will utilize existing BPA lines within a utility right-of-way that crosses the Columbia River to the Oregon side to an existing BPA substation. No changes in land use will occur as a result of the additional line, which has already been permitted for the existing use by BPA.

- The lower reservoir area, including the CGA smelter lands, is classified as Industrial Park (IP). IP areas are areas suitable for the manufacture, distribution, and assembly of finished products that have relatively light impact on adjacent uses and districts.
- The upper reservoir area is primarily classified as Extensive Agriculture (EA). Lands zoned EA encourage the continued practice of farming on lands best suited for agriculture, and prevent or minimize conflicts between common agricultural practices and nonfarm uses.
- Lands between the upper reservoir and lower reservoir are classified as Open Space (OS). The OS classification is intended to conserve the open character of land, and to safeguard the health and safety of people by limiting the development in areas where safe conditions (e.g., ability of first responders to respond, protection against flooding or erosion) are not possible without excessive costs to the community.

The Project falls within Klickitat County EOZ (Chapter 19.39 Klickitat County Code; Figure 9.1-2). The EOZ was established to designate areas suitable for the establishment of energy resource operations based on the availability of energy resources, existing infrastructure, and locations where energy projects can be sensitively sited and mitigated. Under this ordinance, siting criteria were established for the utilization of wind and solar energy resources. Each energy resource project would be subjected to individualized review and the imposition of conditions based on site-specific information, which would be tailored to address project impacts in accordance with the siting criteria. Although proposed energy projects can be sited within the EOZ without a conditional use process, project proponents are required to obtain all necessary local, state, and federal permits and approvals before starting construction. The renewable energy storage capabilities of the proposed Project are consistent with the intent of the EOZ and compatible with other uses of lands in this overlay zone.



Source: Klickitat County 2004

Figure 9.1-2: Klickitat County Energy Overlay Zone

The Project is not located within a designated coastal zone per the CZMA.[1] According to NOAA's Coastal Zone Management Program (NOAA 2019): the Washington coastal zone includes the state's 15 coastal counties that front saltwater; and the Oregon coastal zone includes the state's coastal watersheds and extends inland to the crest of the coast range, with a few minor exceptions (i.e., in the Columbia River Basin, where it extends upstream to the downstream end of Puget Island).

9.1.2 Floodplains and Wetlands

Based on a review of Federal Emergency Management Agency (FEMA) Q3 digital flood data for Klickitat County (FEMA 1998), the Project would be located in uplands, outside of FEMA floodplains.

Project area wetlands are discussed in Section 2.0.

9.1.3 Farmlands

Use of Project lands for cultivated agriculture is limited by soil types. A small portion of the Project area to the west side of the lower reservoir is classified as prime farmland if irrigated; however, cultivated agricultural values are otherwise limited (Ecology 2008). No other lands in the Project area are classified as farmlands. Agricultural uses of non-irrigated pasture lands occur in sage-steppe shrub and grasslands in the upper reservoir area.

9.2 Potential Land Use Resource Impacts

The Project's location was selected due to the Project's compatibility with existing land uses and zoning, and it was designed to minimize greenfield development and disturbance to current and adjacent land use of the site. Although land uses in the entire Project area are currently classified as undeveloped by the County, the lower reservoir area maintains remnant facilities from the CGA smelter, and the upper reservoir site is utilized for wind energy and non-irrigated agriculture (grazing). Project area and adjacent land uses are shown in Figure 9.1-2.

After Project construction, the lower reservoir area would maintain its current industrial land uses. Land use in the upper reservoir area would change where the reservoir and associated facilities are constructed, but adjacent grazing uses would not change. In the area of the penstock where the Project would be constructed underground, the current land surface would not change due to Project construction.

[1] the Washington coastal zone includes the state's 15 coastal counties that front saltwater; and the Oregon coastal zone includes the state's coastal watersheds and extends inland to the crest of the coast range, with a few minor exceptions (i.e., in the Columbia River Basin, where it extends upstream to the downstream end of Puget Island).

Impacts to land use are minimal at the proposed Project location due to the following:

- The Project is compatible with the County's zoning designations. With its location inside the County's EOZ, the Project is consistent with the regulation's purpose of siting energy projects in areas with existing infrastructure and locations that can be sensitively managed. The Project supports generation of renewable energy resources, consistent with the purpose of the overlay zone and nearby wind and hydroelectric energy projects.
- Reuse of a brownfield site is preferred over the development of a greenfield area due to the relatively reduced potential for impacts to environmental and social resources.
- The Project is compatible with adjacent land uses (wind energy development and John Day Lock and Dam). Further, adjacent land uses including energy generation, agriculture, transportation, and undeveloped land would not be impacted by the proposed Project's construction or operations.

Water rights to be utilized for the proposed Project had past industrial use, which is consistent with their intended future use with the proposed Project.

9.3 Applicant Recommendations

The Applicant aims to minimize the potential land use impacts of the Project and maintain the surrounding quality of the landscape. The Project's location within an EOZ is intentional and provides that the Project will be consistent with adjacent land use and intended use of the site.

10.0 AGENCY CONSULTATION

This section contains a summary of agency consultation that has taken place from the filing of the Applicant's Preliminary Permit Application (PPA) through this DLA. Copies of all correspondence regarding the Project have been included (Appendix F). The Applicant will continue to engage in consultation with relevant agencies during the preparation of the Final License Application (FLA).

10.1 Traditional Licensing Process Required Notifications

The PPA for the proposed Project was filed with FERC on October 20, 2017. The Notice of Intent (NOI) and PAD were filed with FERC on January 25, 2019, requesting approval to utilize the Traditional Licensing Process (TLP). The Applicant published a NOI in the Condon Times-Journal on January 31 and February 7, 2019. Notices were also published in the Goldendale Sentinel for 2 weeks between January 30 and February 6, 2019. FERC issued approval of the TLP on March 21, 2019.

A contact list compiled by the Applicant has been maintained to identify those agencies, organizations, individuals, or groups that have been identified as interested parties or who have requested to be included as licensing participants. The contact list has been used to provide

notice of any public meetings, as well as notice of the availability of information for public review. The contact list was included in the distribution list attached to the January 25, 2019, NOI filing of the PAD.

Pursuant to 10 CFR § 4.38, the Applicant is following the required three-stage consultation process, including all meetings and comments periods. Table 10-1 includes the consultation requirements and the current status.

Table 10-1: Pre-filling Process Plan and Schedule

Activity	Responsibility	Time Frame	Completion Date*
File NOI, PAD, request to use TLP	FFP Project 101, LLC		January 25, 2019
Publish Public Notice of NOI, PAD, TLP request	FFP Project 101, LLC		January 30-February 7, 2019
Comments on request to use TLP due to FERC	Stakeholders		February 27, 2019
FERC decision on request to use TLP	FERC	Within 60 days of NOI/PAD	March 21, 2019
Consult with agencies and public re schedule and agenda for Joint Agency/Public Meeting and Site Visit	FFP Project 101, LLC		March-April 2019
Notify FERC and Stakeholders of Joint Meeting	FFP Project 101, LLC	15 days before Joint Meeting	April 11, 2019
Publish Joint Meeting arrangements	FFP Project 101, LLC	14 days prior to Joint Meeting and Site Visit	Week of April 15, 2019
Joint Meeting and Site Visit	FFP Project 101, LLC	30-60 days from approval of TLP	May 1, 2019
Agency and public submit proposed studies	Agencies &Public	60 days from Joint Meeting	May-June 2019
Resolve any study differences	FFP Project 101, LLC, Agencies &Public	Continuous	NA
Distribute DLA	FFP Project 101, LLC		December 2019
Agency and public comments on DLA	Agencies & Public	90 days from issuance of DLA	March 2020
Notify FERC of Joint Meeting, if any	FFP Project 101, LLC	15 days before Joint Meeting	June 2020- *IF NEEDED*
Joint Meeting to resolve any substantial differences on Project proposal	FFP Project 101, LLC, Agencies & Public	within 60 days from comments on DLA	*July 2020 –IF NEEDED*
File license application	FFP Project 101, LLC		June 2020

DLA = Draft License Application; FERC = Federal Energy Regulatory Commission; NOI = Notice of Intent; PAD = Pre-Application Document; TLP = Traditional Licensing Process; *Bold text indicates completion date. Other dates are estimated.

Upon filing this DLA, the Applicant will twice run a notification in the Goldendale Sentinel and The Enterprise in White Salmon, Washington. A bound copy of the DLA will be sent to the offices at KPUD shortly after filing and will be available to the public for a period of no less than 30 days. Additionally, the Applicant will send all stakeholders, as identified in the Initial Statement of this DLA, an electronic copy (compact disc) of the DLA via certified mail. Proof of

public notification, including copies of letters and a tearsheet from the newspaper, will be submitted no later than 30 days following the filing of the DLA.

After the appropriate consultation period outlined in Table 10-1, the Applicant intends to file an FLA before the FERC Preliminary Permit Expires on March 7, 2021.

The Applicant will continue to maintain a public reference file at Rye Development's Portland, Oregon, offices. The public reference file will include copies of written correspondence, documentation of phone conversations, meeting notices, agendas and summaries, study plans, study reports, status reports, and other documents developed during consultation or submitted for inclusion in the public reference file. The Applicant will submit all documents in the public reference file to FERC as part of the formal licensing record. If a document includes sensitive information—such as a site location for a federally listed species and/or its designated critical habitat, or for an archaeological site—the document will be clearly marked "Not for Public Disclosure" and appropriate measures will be taken to secure the sensitive material, consistent with state and federal regulations.

The Applicant maintains a Project website:

http://www.ryedevelopment.com/projectstor/goldendale-washington/

This website will provide access to documents developed during the course of the licensing consultation, such as meeting notices, meeting summaries, study plans, and study reports. The Project website will also have an information library that allows licensing participants to access other relevant information in support of the license application.

Physical location where the public reference file will be available:

Klickitat PUD
1313 S. Columbus Ave.
Goldendale, Washington 98620

10.2 Meetings

The Applicant held a joint meeting with afternoon and evening sessions and a site visit on May 1, 2019. Written notice of the date, time, and location of the joint meeting and site visit was provided to FERC on April 5, 2019. Notice of the meeting was published in The Goldendale Sentinel and The Enterprise in White Salmon, Washington. The joint meeting was held at the Goldendale Grange Hall, and the site visit was held between the afternoon and evening sessions. A list of attendees and transcripts of the meeting were filed with FERC on May 20, 2019.

10.3 Consultation with Agencies

As a result of ongoing consultation efforts since the filing of the PPA pursuant to 18 CFR 4.38, comments have been received from a variety of public agencies, Indian tribes, and non-governmental organizations. These comments and Applicant's responses are summarized below and organized by resource area. The correspondence is included in Appendix F of this DLA.

10.3.1 Water Quality and Wetlands

Comments were received from USFWS suggesting that the effects of Project construction, operation, and maintenance on water quality and water temperature in the Columbia River should be evaluated. USFWS suggested that diverted flows could affect chemical constituents such as DO, pH, salinity, turbidity, and others. A study should be conducted to characterize water quality at different flow levels to detect changes in water chemistry that may be caused by Project construction and operation. Altered instream water temperatures can also affect oxygen concentration and availability for fish and aquatic organisms.

The Applicant responded to USFWS comments on June 27, 2019, that because the Project is a closed-loop system with no outfall to any surface waterbody, the Project would not have any water quality effect on the Columbia River or other surface waterbodies. If drainage of the lower reservoir were needed for maintenance, the water would be pumped into the upper reservoir and vice versa. Only one reservoir will be filled to capacity at any given time.

The Applicant is proposing to purchase water from an existing water right for all Project operations. This should protect existing surface and groundwater resources, as no additional allocations will be required. The reservoirs will include physical features to minimize the capture of surface water runoff and preserve hydrology associated with the area. Specifically, overland flow will be directed away from Project reservoirs and allow normal infiltration to occur outside of the two reservoir footprints.

Nearly all Project-related precipitation losses will be due to precipitation collected within each reservoir. Normal Project operation and maintenance will not require that the reservoirs are drained, and spillage of water from the reservoir system is unlikely due to its closed nature.

10.3.2 Aquatic Resources

Comments regarding aquatics resources were received from WDFW, USFWS, USDI, and Oregon Department of Fish and Wildlife (ODFW).

10.3.2.1 Washington Department of Fish and Wildlife

October 28, 2014—WDFW responded to a request for information relevant to the previous proposed project, the JD Pool Pumped Storage Hydroelectric Project (JD Pool Project, FERC No. 13333). The letter expressed concern for the potential to entrain adult and juvenile fish in the

intake and through the Project turbines and pumps. WDFW recommended installation of a fish screen on the intake or a juvenile bypass system to prevent fish entrainment. WDFW was also concerned about potential impacts to fish from toxic waste accumulated near the CGA Plant.

10.3.2.2 Oregon Department of Fish and Wildlife

December 20, 2018—ODFW stated that they support the NMFS comments dated October 29, 2014, regarding requiring screening of the intake and potential impacts to Columbia River water quality and quantity during Project operation. ODFW policy requires screening on any water diversion where fish are present; even though the proposed intake will under the jurisdiction of the State of Washington, ODFW still has a responsibility to protect the fisheries resources in the Columbia River. ODFW policy also requires mitigation for any loss of fish habitat resulting from development, and recommends investigation and mitigation planning for any risks to fish and aquatic resources.

10.3.2.3 U.S. Fish and Wildlife Service

In response to a May 1, 2019, joint meeting between agencies and additional interested parties regarding the PAD, the USFWS provided comments and recommendations for additional studies in a letter dated May 30, 2019 (Appendix F). The USFWS referenced their comments from a letter dated April 7, 2015, in which they filed a response concerning the previously proposed JD Pool Project. The USFWS expressed similarities between the Goldendale Project and the JD Pool Project and, therefore, posed that their 2015 comments are applicable for the currently proposed Project (also see the Applicant's response letter described below, dated June 27, 2019).

The April 7, 2015, letter included the following comments applicable to fish and aquatic resources:

- The USFWS expressed concern about potential Project impacts to "…fish, amphibians, and other aquatic fauna and flora and the habitat that supports them" and to "geomorphology, substrate, sediment transport, woody debris transport, streamflow regimes, flow release timing, flow fluctuation, water quality, water temperature, nutrients, and fish passage."
- The USFWS suggested that the Applicant identify existing aquatic species in the study area, and potential effects from Project construction and operation on aquatic species, streamflow regimes, timing, and flow fluctuations. Any modified streamflow regime should protect existing aquatic habitat.
- Streamflow fluctuations in the Columbia River—suggested impacts of Project operation on streamflow be evaluated in the Columbia River upstream and downstream of the intake structure; flow recommendations should be based on site-specific hydrologic and biologic information by applying the USFWS Instream Flow Incremental Methodology.

- Water quality and temperature in the Columbia River—evaluate the potential Project effects on water quality (e.g., DO, pH, salinity, turbidity, temperature) at different flow levels to determine potential impacts on fish and aquatic organisms.

- Movement of fish and aquatic organisms—evaluate potential Project effects including entrainment of fish; blocked or delayed fish movement, injury, or mortality of upstream or downstream fish movement; reduced streamflow. The Project should not interfere with the USACE operation of the John Day Dam.

- Cumulative effects—evaluate any cumulative effects on fish and aquatic resources and habitat associated with impacts to water quantity, quality, fisheries, and aquatic species from other projects.

10.3.3 Wildlife

The Applicant has had consultation concerning wildlife and avian resources with federal, state, and local agencies and stakeholders, as presented in Table 10.3-1.

Table 10.3-1: Consultation Chronology for Project wildlife resources

Date	Purpose
September 29, 2014	Letter request from Jim Smith (KPUD) to Jessica Gonzales (USFWS), Ken Homolka (ODFW), Phil Anderson (WDFW), and other organizations with management responsibilities for information regarding environmental resources in the Project.
October 28, 2014	Letter from Patrick Verhey (WDFW) to Brian Skeahan (KPUD) providing information relevant to the Project as well as outlining initial Project impact concerns to habitat, avian species, eagles, and fish.
October 30, 2014	Letter from Elizabeth Moats (ODFW) to Brian Skeahan (KPUD) providing Oregon wildlife resources relevant to the Project.
November 24, 2014	Correspondence from USFWS to KPUD.
January 26, 2015	Teleconference between Stephen Lewis (USFWS), Patrick Verhey (WDFW), Brian Skeahan (KPUD), Nathan Sandvig (MWH Americas), and Erik Steimle (ERM) to discuss the Project, study design, and potential impacts to wildlife.
March 18, 2015	Teleconference between Brian Sekeahan (KPUD); Kathleen King, Cynthia Jones, Clint Smith, Brian Saddan (MWH); Erik Steimle, Keturah Witter (ERM); Patrick Verhey, Dave Anderson, Justin Allegro, Sandra Jonker, Stephani Bergh, Jim Watson (WDFW); and Steve Lewis (USFWS) to discuss the Project License Application.
April 2, 2015	Letter from Patrick Verhey (WDFW) to Kimberly Bose (FERC) providing additional study requests.
April 7, 2015	Letter from Eric Rickerson (USFWS) to Brian Skeahan (KPUD) and filed with FERC providing additional study requests related to fish and wildlife.
April 14, 2015	Email correspondence between Patrick Verhey (WDFW) and Erik Steimle (ERM) providing updated WDFW data on golden eagle habitat use in the Project area.
May 5, 2015	Email correspondence between James Watson (WDFW), Patrick Verhey (WDFW), and Erik Steimle (ERM) regarding WDFW eagle nest location west of the lower reservoir.
December 20, 2018	Email correspondence between Elizabeth Moats (ODFW) and Erik Steimle (Rye Development) regarding ODFW's concerns which are unchanged since 2014.

Date	Purpose
December 4, 2018	Email correspondence between Patrick Verhey (WDFW) and Erik Steimle (Rye Development) regarding WDFW's concerns which are unchanged since 2014 except for increased raptor blade strikes.
May 1, 2019	In accordance with the FERC regulations under the Traditional Licensing Process (TLP), Rye Development and National Grid hosted joint agency and public meetings on behalf of the Applicant for resource agencies, tribes, and other interested parties.
May 28, 2019	In response to the May 1st meetings and PAD, the WDFW submitted additional study requests and comments on the PAD to Kimberly Bose (FERC).
May 30, 2019	In response to the May 1, 2019, meetings and PAD, the USFWS (Region 1) submitted additional study requests and comments on the PAD to Kimberly Bose (FERC).
June 27, 2019	Rye Development filed Response to May 28, 2019, Comments and Additional Study Requests from USFWS.
June 27, 2019	Rye Development filed Response to May 30, 2019, Comments and Additional Study Requests from WDFW.
August 14, 2019	Email from Patrick Verhey (WDFW) to Erik Steimle (Rye Development) providing updated WDFW data on golden eagle and prairie falcon (*Falco mexicanus*) habitat use in the Project area.
September 18, 2019	Phone conversation between Patrick Verhey (WDFW) and Leslie Rodman-Jaramillo (ERM) discussing 2019 data on golden eagle and prairie falcon habitat use in the Project area.
September 18, 2019	Phone conversation between James Watson (WDFW) and Leslie Rodman-Jaramillo (ERM) discussing 2019 data on golden eagle and prairie falcon habitat use in the Project area. Mr. Watson provided copies of raptor studies pertinent to the Project area.
September 23, 2019	Phone conversation between Stefanie Bergh (WDFW) and Leslie Rodman-Jaramillo (ERM) discussing 2019 data on golden eagle and prairie falcon habitat use and survey methodology in the Project area.
September 23, 2019	Phone conversation between Michael Ritter (WDFW) and Leslie Rodman-Jaramillo (ERM) discussing wildlife studies and publicly available reports associated with the Windy Flats Wind Energy Facility near the Project area.

10.3.3.1 United States Fish and Wildlife Service

In response to a May 1, 2019, joint meeting between agencies and additional interested parties regarding the PAD, in a letter dated May 30, 2019, the USFWS provided comments and recommendations for additional studies (see Appendix F). The USFWS referenced their comments from a letter dated April 7, 2015, where they filed a response concerning the previously proposed JD Pool Project. The USFWS expressed similarities between the Goldendale Project and the JD Pool Project; therefore, posed that their 2015 comments are applicable for the currently proposed Project. The USFWS expressed concerns of cumulative impacts to avian species, including raptors and waterfowl in the Windy Flats/Windy Ridge area. The agency was concerned with loss of foraging habitat for golden eagles due to the construction of water reservoirs.

The USFWS emphasized that the potential attractant created by the proposed reservoirs may increase the number of bald and golden eagles in the area, resulting in increasing risk of wind

turbine strikes. The USFWS also emphasized wildlife studies occurring for longer than one year were necessary to document accurate effects on wildlife resources.

The USFWS requested to be consulted in the development of an Avian Protection Plan (WMP; Appendix D) along with evaluation of the appropriateness of eagle permits. The agency recommended that transmission and distribution lines be buried or otherwise designed according to guidelines provided by the APLIC and the USFWS to reduce loss of habitat and prevent electrocution. No other concerns specific to mammals or reptiles were raised in the USFWS letter. The Applicant's response to USFWS's letter was filed with FERC on June 27, 2019, and can also be found in Appendix F.

10.3.3.2 Washington Department of Fish and Wildlife

In response to a May 1, 2019, joint meeting between agencies and additional interested parties and the PAD, in a letter dated May 28, 2019, the WDFW provided comments and recommendations for additional studies (Appendix F). The WDFW has conducted extensive studies of associated golden eagle territory (e.g., John Day Dam territory), as well as bald eagle and other raptor use of the Project area (Watson et al. 2014a, 2014b).

The WDFW expressed concern about the loss of prime foraging habitat and the effects of construction disturbance and standard operations in the John Day Dam golden eagle territory, particularly near the vicinity of three historic nest locations located on the cliff face between the new reservoirs. The WDFW has stated that the reservoirs could also attract bald eagles, which could adversely impact the golden eagles during nesting.

The WDFW had concerns about permanent and temporary impacts resulting in the loss of mammalian foraging habitat, and the adverse effects of construction disturbance and standard operations on wintering mule deer, and impacts on species that use talus slopes in the area.

10.3.3.3 Oregon Department of Fish and Wildlife

The ODFW reported general concern for terrestrial species, concern for a peregrine falcon nesting site in the vicinity, and construction of any new transmission lines. New construction in Oregon would be limited to the utilization of an existing, permitted, available circuit on existing BPA structures within their existing right-of-way. Therefore, any new construction in Oregon would be consistent with required BPA methodology and would follow their management plans, including conformance with APLIC standards and other BMPs for construction, design, and operations to prevent or reduce impacts to wildlife.

10.3.4 Botanical Resources

No agency comments have been received regarding botanical resources.

10.3.5 Cultural Resources

Comments regarding archaeological resources and TCPs have been received from the following:

- Confederated Tribes of the Umatilla Indian Reservation (to FERC January 1, 2018 Privileged Security Level); Email to Applicant November 27, 2018);
- Confederated Tribes and Bands of the Yakima Nation (to Applicant February 14, 2018; to FERC February 21, 2019);
- Oregon SHPO (to Applicant, December 20, 2018); and
- FERC (to Tribes, March 1, 2019; Telephone Memo, June 19, 2019).

The Umatilla comments on January 2018 were filed with FERC under Privileged Security Level and were not shared with the Applicant. In their November 2018 email, they indicate that the proposed undertaking is within a historic property of religious and cultural significance to the Confederated Tribes of the Umatilla Indian Reservation and that the project will adversely affect this historic property. They also state that the Tribal Cultural Resources Protection Program will like to work with the Applicant and FERC to consider resolution of the adverse effects to the historic property.

The Yakama Tribe's February 2018 comments indicate that they are opposed to the proposed Project as it will cause detrimental impacts to significant cultural resources near the John Day Dam and the Columbia Hills and that these cultural resources are sacred to the Yakama Nation and include archaeological, ceremonial, burial, petroglyph, monumental, and ancestral use sites. They indicate it is the responsibility of the Yakama Nation to protect those resources now and in the future for the benefit of those not yet born.

In their February 2019 submittal to FERC, the Yakama Tribe expresses several concerns with the Project. They reference their February 2018 opposition and indicate that, no resolution was provided aside from stating the desire to contract with the Yakama CRP and that hiring a Yakama Nation program to provide technical expertise is not a resolution to the concerns brought forth. They disagree with the Applicant's statement that resource issues involved in the Project are minimal, and assert the likelihood of significant dispute over studies due to the significance of the sacred site and associated resources. They indicate that had they had the opportunity to review the application and draft HPMP, they could have provided information to inform the application process. Finally, the tribe expresses concerns that the Project will progress such that they will be required to mitigate a sacred site and that they are formally opposed to the project because it will damage a sacred TCP.

Oregon SHPO comments that a search through SHPO archaeological database revealed several cultural resources in the area of the project and that it is important that a resource survey be

conducted to identify any cultural remains within the Project area prior to ground disturbing activities.

FERC wrote to the leaders of the Umatilla, Warms Springs, and Yakama tribes in March 2019 requesting consultation of the proposed project. A follow-up internal telephone memo was filed documenting FERC's attempts to correspond with the tribes, but indicated they had had no contact.

10.3.6 Yakama Nation 2019 Survey Results

In response to consultation with tribes, the Applicant contracted the Yakama Nation CRP to perform an archaeological resources and TCP identification survey of the proposed APE in 2019. Conclusions and recommendations from the report are summarized below.

The report (included as Appendix H of this DLA) recommends that avoidance should occur for all sites within the proposed Project area. Archaeological sites that cannot be avoided by project activities should be evaluated for their eligibility and contribution to the existing Push-pum TCP, Columbia Hills Multiple Property Documentation (MPD), and Columbia Hills Archaeological District NRHP eligibility.

The report states that the proposed Project will compromise the eligibility of the existing Push-pum TCP as it will impact existing root grounds that contribute to the TCP's NRHP eligibility under Criterion A. The report recommends that the TCP is eligible under Criterion B as well for its association with significant persons in our nation's past, namely each of the roots and Speelyi (Coyote).

The report states that the proposed Project will compromise the eligibility of the Columbia Hills MPD as it will compromise the Push-pum TCP, which is directly associated with Skin-pum Point, both of which contribute to the eligibility of the MPD.

The report states that the Push-pum TCP boundary was drawn erroneously and should encompass the root grounds that contribute to the site's eligibility. Those root grounds were recorded in 1995 and again in 2019.

It is the Applicant's intent to collaborate with the Yakama in developing the final APE and HPMP to ensure that proper procedures and processes take place to protect, enhance, and mitigate for impacts to eligible historic properties.

10.3.7 Geology and Soils

In July 2019, the Applicant received comments from the USACE that included a comment about the possibility of storage pond failure. USACE requested that an evaluation of the impacts of potential materials failure to affect or stop navigation on the Columbia River or the use of John Day Lock and Dam.

Due to the position and configuration of the reservoirs and the lack of surface water inflow or out of the reservoirs, the risk of failure is low. However, as Project design progresses, failure and material risks will be evaluated as appropriate.

10.3.8 Recreation

Comments related to recreation were received from the Cascades Paragliding Association. The Applicant consulted with the President of the Cascades Paragliding Association in December of 2018 to better understand paragliders use of the Cliffside Launch. The Project as proposed will not interfere with the use of Cliffside Launch, nor will it interfere with local flyers.

10.3.9 Aesthetic Resources and Land Use

No agency comments have been received regarding aesthetic resources or land use in the project area.

10.4 Relevant Resource Management Plans

As stipulated in Section 10(a)(2)(A) of the Federal Power Act, 16 U.S. Code § 803 (a)(2)(A) requires FERC to consider the extent to which a proposed Project is consistent with federal or state comprehensive plans for improving, developing, or conserving a waterway or waterways affected by the Project.

FERC will accord Federal Power Act §10(a)(2)(A) comprehensive plan status to any federal or state plan that:

- Is a comprehensive study of one or more of the beneficial uses of a waterway or waterways;
- Specifies the standards, data, and methodology used; and
- Is filed with the Secretary of the Commission.

The Applicant has reviewed the filed documents for the State of Washington and adjoining Oregon waterways, as well as plans of federal agencies listed in FERC's Revised List of Comprehensive Plans, 2018, in order to explain how and why the proposed Project would, would not, or should not comply with the qualifying comprehensive plans as defined in 18 CFR § 4.38.

Upon careful and deliberate scrutiny of the listed qualifying comprehensive plans, justification for the Applicant's decisions with regard to each of the plans listed relative to the proposed Project area is provided below.

10.4.1 Qualifying Comprehensive Plans Deemed Applicable

The qualifying plans listed below have been deemed potentially applicable. Each plan is listed separately with a brief explanation for its inclusion as an applicable qualifying comprehensive plan.

10.4.1.1 Oregon

- Department of the Army, Corps of Engineers. Portland District. 1993. Water resources development in Oregon. Portland, Oregon.
  - Potentially applicable because:
    - The proposed Project is located upstream from the Portland District near to the Columbia River and this plan would be used to evaluate the proposed Project's consistency with the Oregon water resources development goals set forth by the USACE.
- Hydro Task Force and Strategic Water Management Group. 1988. Oregon comprehensive waterway management plan. Salem, Oregon.
  - Potentially applicable because:
    - The proposed Project is located on the Columbia River, an Oregon waterway, and is a pool-pumped storage hydroelectric Project and therefore falls under the Oregon comprehensive waterway management plan. This plan would be used to evaluate the proposed Project's consistency with the Oregon comprehensive waterway management goals set forth by the Hydro Task Force and Strategic Water Management Group.
- Northwest Power and Conservation Council. 2014. Columbia River Basin Fish and Wildlife Program. Portland, Oregon. Council Document 2014-12. October 2014.
  - Potentially applicable because:
    - The proposed Project is located near the Columbia River and the John Day Dam and this plan would be used to evaluate the proposed Project's consistency with the Columbia River Basin fish and wildlife program set forth by the Northwest Power and Conservation Council.
- Northwest Power and Conservation Council. 2016. The Seventh Northwest Conservation and Electric Power Plan. Portland, Oregon. Council Document 2016-02. February 2016.
  - Potentially applicable because:
    - The proposed Project is located near the Columbia River and the John Day Hydroelectric Dam and this plan would be used to evaluate the proposed Project's

consistency with The Sixth Northwest conservation and electric power plan set forth by the Northwest Power and Conservation Council.

- Oregon Department of Energy. 1987. Oregon final summary report for the Pacific Northwest rivers study. Salem, Oregon. November 1987.
  - Potentially applicable because:
    - The proposed Project is located near the Columbia River and the John Day Dam and this plan would be used to evaluate the proposed Project's consistency with the Oregon final summary report for the Pacific Northwest rivers study set forth by the Oregon Department of Energy.
- Oregon Department of Environmental Quality. 1978. Statewide water quality management plan. Salem, Oregon. November 1978. Seven volumes.
  - Potentially applicable because:
    - The proposed Project is located near the Columbia River, a waterway with concurrent Washington and Oregon jurisdiction for regulating, protecting, and preserving fisheries resources. This plan would be used to evaluate the proposed Project's consistency with the Oregon Statewide water quality management plan set forth by the DEQ.
- Oregon Water Resources Board. 1973. Surface area of lakes and reservoirs. Salem, Oregon.
  - Potentially applicable because:
    - The proposed Project is located near the Columbia River, a waterway with concurrent Washington and Oregon jurisdiction for regulating, protecting, and preserving fisheries resources. This plan would be used to evaluate the proposed Project's consistency with the relevant water-related rules and regulations.
- State of Oregon water use programs Oregon Water Resources Commission. 1987.
  - Potentially applicable because:
    - The proposed Project is located near the Columbia River that runs between Washington State and Oregon State. The proposed Project would use water from the Columbia River. This plan would be used to evaluate consistency with the State of Oregon water use programs set forth by Oregon Water Resources Commission.
- Oregon Water Resources Department. 1988. Oregon water laws. Salem, Oregon.
  - Applicable because:
    - The proposed Project is located near the Columbia River that runs between Washington State and Oregon State. The proposed Project would use water from the

Columbia River. This plan would be evaluated for consistency with the Oregon water laws set forth by Oregon Water Resources Department.

10.4.1.2 Washington

- Bureau of Land Management. 1987. Spokane resource area management plan. Department of the Interior, Spokane, Washington. May 1987.
  - Potentially applicable because:
    - The proposed Project is located within the Spokane resource area. The BLM maintains records of subsurface mineral rights. This plan would be used to evaluate the Project's consistency with the Spokane resource area management plan goals set forth by the BLM.
- National Marine Fisheries Service. 2004. Lower Columbia Salmon Recovery and Fish & Wildlife Subbasin Plan. Washington. December 15, 2004.
  - Potentially applicable because:
    - The proposed Project is located in the Lower Middle Columbia River Subbasin, near the Columbia River and the John Day Dam. This plan would be used to evaluate the proposed Project's consistency with the Lower Columbia Salmon Recovery and Fish & Wildlife Subbasin Plan set forth by the NMFS.
- Northwest Power and Conservation Council. 2014. Columbia River Basin Fish and Wildlife Program. Portland, Oregon. Council Document 2014-12.
  - Potentially applicable because:
    - The proposed Project is located near the Columbia River and the John Day Dam and this plan would be used to evaluate the proposed Project's consistency with the Columbia River Basin fish and wildlife program set forth by the Northwest Power and Conservation Council.
- Northwest Power and Conservation Council. 2016. The Seventh Northwest Conservation and Electric Power Plan. Portland, Oregon. Council Document 2016-02. February 2016.
  - Potentially applicable because:
    - The proposed Project is located near the Columbia River and the John Day Hydroelectric Dam and this plan would be used to evaluate the proposed Project's consistency with the Sixth Northwest conservation and electric power plan set forth by the Northwest Power and Conservation Council.
- State of Idaho. State of Oregon. State of Washington. Confederated Tribes of the Warm Springs Reservation of Oregon. Confederated Tribes of the Umatilla Indian Reservation. Nez

Perce Tribe. Confederated Tribes and Bands of the Yakama Indian Nation. 1987. Settlement Agreement pursuant to the September 1, 1983, Order of the U.S. District Court for the District of Oregon in Case No. 68-5113. Columbia River fish management plan. Portland, Oregon. November 1987.

- Potentially applicable because:
  - The proposed Project is located near the Columbia River that runs between Washington State and Oregon State. The proposed Project will use water from the Columbia River. This plan would be used to evaluate the proposed Project's consistency with the Columbia River fish management plan set forth by State of Idaho, State of Oregon, State of Washington, Confederated Tribes of the Warm Springs Reservation of Oregon, Confederated Tribes of the Umatilla Indian Reservation, Nez Perce Tribe, and Confederated Tribes and Bands of the Yakama Indian Nation.

- State of Washington. 1977. Statute establishing the State scenic river system, Chapter 79.72 RCW. Olympia, Washington.
  - Potentially applicable because:
    - The proposed Project is located in Klickitat County, Washington, near the Columbia River, which is a water resource and scenic river.

- Washington Department of Community Development. Office of Archaeology and Historic Preservation. 1987. A resource protection planning process identification of prehistoric archaeological resources in the lower Columbia study unit. Olympia, Washington.
  - Potentially applicable because:
    - The proposed Project is located in the Lower Middle Columbia Basin and near the Columbia River in Washington State. This plan would be used to evaluate the proposed Project's consistency with the resource protection planning process identification of prehistoric archaeological resources in the lower Columbia study unit set forth by the Washington Department of Community Development and Office of Archaeology and Historic Preservation.

- Washington Department of Community Development. Office of Archaeology and Historic Preservation. 1987. Resource protection planning process—Paleoindian study unit. Olympia, Washington.
  - Potentially applicable because:
    - The proposed Project is located in the Lower Middle Columbia Basin and near the Columbia River in Washington State. This plan would be used to evaluate the proposed Project's consistency with the Resource protection planning process—

Paleoindian study unit set forth by the Washington Department of Community Development and Office of Archaeology and Historic Preservation.

- Washington Department of Community Development. Office of Archaeology and Historic Preservation. 1987. Resource protection planning process—mid-Columbia study unit. Olympia, Washington.
  - Potentially applicable because:
    - The proposed Project is located in the Lower Middle Columbia Basin and near the Columbia River in Washington State. This plan would be used to evaluate the proposed Project's consistency with the resource protection planning process—mid-Columbia study unit set forth by the Washington Department of Community Development.
- Washington State Department of Ecology. 1978. Water resources management program: Columbia River John Day and McNary pools. Olympia, Washington. October 1978.
  - Potentially applicable because:
    - The proposed Project is located near the John Day Hydroelectric Dam on the Columbia River and is an addition to the current John Day Hydroelectric Dam system. The proposed Project is downstream from the McNary Hydroelectric Dam. This plan would be used to evaluate the proposed Project's consistency with the water resources management program: Columbia River John Day and McNary pools set forth by Ecology.
- Washington State Department of Ecology. 1986. Application of shoreline management to hydroelectric developments. Olympia, Washington. September 1986.
  - Potentially applicable because:
    - The proposed Project is located near the John Day Hydroelectric Dam on the Columbia River and is an addition to the current John Day Hydroelectric Dam system. This plan would be used to evaluate the proposed Project's consistency with the application of shoreline management to hydroelectric developments set forth by Ecology.
- Washington State Department of Ecology. 1982. Instream resource protection program for the main stem Columbia River in Washington State. Olympia, Washington.
  - Potentially applicable because:
    - The proposed Project is located near the Columbia River, the largest river system in Washington and the Pacific Northwest. This plan would be used to evaluate the

proposed Project's consistency with the instream resource protection program for the main stem Columbia River in Washington State set forth by Ecology.

- Washington Department of Fisheries. 1987. Hydroelectric Project assessment guidelines. Olympia, Washington.
  - Potentially applicable because:
    - The proposed Project is located near the John Day Dam on the Columbia River and is an addition to the current John Day Hydroelectric Dam system. This plan would be used to evaluate the proposed Project's consistency with hydroelectric Project assessment guidelines set forth by the Washington Department of Fisheries.
- Washington Department of Fish and Wildlife. 1997. Management recommendations for Washington's priority habitats: Riparian. Olympia, Washington. December 1997.
  - Potentially applicable because:
    - The proposed Project is located within rural Washington State. This plan would be used to evaluate the proposed Project's consistency with management recommendations for Washington's priority habitats: Riparian, set forth by the WDFW.
- Washington Department of Fish and Wildlife. 2004. Management recommendations for Washington's priority species, Volume IV: Birds. Olympia, Washington. May 2004.
  - Potentially applicable because:
    - The proposed Project is located within rural Washington State. This plan would be used to evaluate the proposed Project's consistency with management recommendations for Washington's priority species, Volume IV: Birds, set forth by the WDFW.
- Washington Department of Fish and Wildlife. 2005. Washington's comprehensive wildlife conservation strategy. Olympia, Washington. September 19, 2005.
  - Potentially applicable because:
    - The proposed Project is located within rural Washington State. This plan would be used to evaluate the proposed Project's consistency with Washington's comprehensive wildlife conservation strategy set forth by the WDFW.
- Washington Department of Game. 1987. Strategies for Washington's wildlife. Olympia, Washington. May 1987.

- Potentially applicable because:
  - The proposed Project is located within Washington State. This plan would be used to evaluate the proposed Project's consistency with strategies for Washington's wildlife goals set forth by the Washington Department of Game.

- Washington Department of Natural Resources. 1987. State of Washington natural heritage plan. Olympia, Washington.
  - Potentially applicable because:
    - The proposed Project is located within Washington State. This plan would be used to evaluate the proposed Project's consistency with State of Washington natural heritage plan goals set forth by the Washington Department of Game.

- Washington Department of Natural Resources. 1997. Final habitat conservation plan. Olympia, Washington. September 1997.
  - Potentially applicable because:
    - The proposed Project lies within the Klickitat County which is included in the final habitat conservation plan. This plan would be used to evaluate the proposed Project's consistency with final habitat conservation plan goals set forth by the DNR.

- Washington State Energy Office. 1992. Washington State hydropower development/resource protection plan. Olympia, Washington. December 1992.
  - Potentially applicable because:
    - The proposed Project is located near the John Day Hydroelectric Dam on the Columbia River. This plan would be used to evaluate the proposed Project's consistency with Washington State hydropower development/resource protection plan set forth by the Washington State Energy Office.

- Washington State Parks and Recreation Commission. 1988. Washington State scenic river assessment. Olympia, Washington. September 1988.
  - Potentially applicable because:
    - The Columbia River, the largest river in the Pacific Northwest region including Washington, is included in the Scenic Rivers program report by Washington State Parks and Recreation Commission. The proposed Project is located near the Columbia River.

- Washington State Parks and Recreation Commission. 1988. Scenic rivers program: report. Olympia, Washington. January 29, 1988.

- Potentially applicable because:
  - The Columbia River, the largest river in the Pacific Northwest region including Washington, is included in the Scenic Rivers program report by Washington State Parks and Recreation Commission. The proposed Project is located near the Columbia River.

- Washington State Recreation and Conservation Office. 2013. Outdoor Recreation in Washington, the 2013 State Comprehensive Outdoor Recreation Plan.
  - Potentially applicable because:

The proposed Project is located in Washington State and has low likelihood of impacting any recreation resources in the vicinity. The plan would be used to evaluate the proposed Project's consistency with Washington's recreation goals.

10.5 Correspondence

A summary and copies of all correspondence related to the Project are included in Appendix F.

11.0 REFERENCES

APLIC (Avian Power Line Interaction Committee). 2006. *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006*. Edison Electric Institute, APLIC, and the California Energy Commission. Washington, DC.

APLIC (Avian Power Line Interaction Committee) and USFWS (United States Fish and Wildlife Service). 2005. *Avian Protection Plan Guidelines*.

Askham, Leonard R. 1994. Franklin, Richardson, Columbian, Washington, and Townsend Ground Squirrels. The Handbook: Prevention and Control of Wildlife Damage. Accessed June 2019. https://digitalcommons.unl.edu/cgi/viewcontent.cgi?referer=https://www.google.com/&httpsredir=1&article=1023&context=icwdmhandbook

AWEA (American Wind Energy Association). 2017. *State Fact Sheets*. Accessed January 25, 2018. https://www.awea.org/resources/fact-sheets/state-facts-sheets.

Butterflies and Moths of North America. 2018. *Juniper Hairstreak* Callophrys gryneus *(Hübner, [1819])*. Accessed January 25, 2019. https://www.butterfliesandmoths.org/species/Callophrys-gryneus.

Cabrera-Cruz, S.A., J.A. Smolinsky, and J.J. Buler. 2018. *Light pollution is greatest within migration passage areas for nocturnally-migrating birds around the world*. Scientific Reports (2018)8:3261. Accessed November 2019. https://www.researchgate.net/publication/323266273_Light_pollution_is_greatest_within_migration_passage_areas_for_nocturnally-migrating_birds_around_the_world#pf7.

Camp, Victor E., S. P. Reidel, M. E. Ross, R. J. Brown, and S. Self. 2017. *Field-Trip Guide to the Vents, Dikes, Stratigraphy, and Structure of the Columbia River Basalt Group, Eastern Oregon and Southeastern Washington*. Scientific Investigations Report 2017-5022-N. U.S. Department of the Interior, U.S. Geological Survey.

_____. 2018. *Klickitat County, Washington (WA)*. Accessed January 25, 2019. http://www.city-data.com/county/Klickitat_County-WA.html.

Cornell (Cornell Lab of Ornithology). 2015. *All About Birds Species Information*. Accessed January 25, 2019. https://www.allaboutbirds.org/.

Data USA. 2016. *Klickitat County, WA*. Accessed January 2019. https://datausa.io/profile/geo/klickitat-county-wa/#economy.

DEQ (Oregon Department of Environmental Quality). 2012. *Water Quality Assessment—Oregon's 2012 Integrated Report Assessment Database and 303(d) list*. Accessed January 25, 2019. http://www.deq.state.or.us/wq/assessment/rpt2012/search.asp.

DNR (Washington Department of Natural Resources). 2014a. *Washington Department of Natural Resources Available GIS Data*.

_____. 2014b. *Washington Natural Heritage Information System: List of Known Occurrences of Rare Plants in Washington—Klickitat County*. Accessed January 2019. https://web.archive.org/web/20161128211209/http://www1.dnr.wa.gov/nhp/refdesk/lists/plantsxco/klickitat.html.

Duncan, N. 2005. *Conservation Assessment for* Cryptomastix hendersoni *Columbia Oregonian*. Accessed January 2019. https://www.blm.gov/or/plans/surveyandmanage/files/ca-ig-cryptomastix-hendersoni-2005-09.pdf.

Ecology (Washington State Department of Ecology). 2008. *Klickitat County—Farm Soils Map*. Accessed May 14, 2015. https://web.archive.org/web/20150908015205/http://www.ecy.wa.gov/services/gis/maps/county/soils/soils20.pdf.

_____. 2011a. *Water Quality Standards for Surface Waters of the State of Washington, Chapter 173-201a WAC*. Accessed October 10, 2014. https://web.archive.org/web/20170215150758/https://fortress.wa.gov/ecy/publications/publications/0610091.pdf .

_____. 2011b. *Long-Term Water Supply and Demand Forecast*. 2011 Washington State Legislative Report.

_____. 2012. *Focus on Water Availability, Water Resources Program, Rock-Glade Watershed, WRIA 31*. Accessed October 10, 2014. https://fortress.wa.gov/ecy/publications/publications/1111035.pdf.

_____. 2014a. *Columbia Gorge Aluminum*. Accessed October 2014. https://fortress.wa.gov/ecy/gsp/Sitepage.aspx?csid=11797.

_____. 2014b. *Agreed Order No. DE 10483*. In the Matter of Remedial Action by: Lockheed Martin Corporation and NSC Smelter, LLC.

_____. 2019a. *Well Report Map Menu*. Accessed January 2, 2019. https://fortress.wa.gov/ecy/wellconstruction/map/wclswebMap/WellConstructionMapSearch.aspx.

_____. 2019b. *State Water Quality Atlas*. Accessed January 4, 2019. https://fortress.wa.gov/ecy/waterqualityatlas/map.aspx?CustomMap=y&RT=1&Layers=30&Filters=n,y,n,n&F2.1=1&F2.2=0&BBox=-14338616,5395963,-12562831,6503994.

_____. 2019c. *State Water Quality Assessment 303(d)/305(b) List*. Accessed January 4, 2019. https://fortress.wa.gov/ecy/approvedwqa/ApprovedSearch.aspx.

_____. 2019d. *Water Resources Explorer*. Accessed January 25, 2019. https://fortress.wa.gov/ecy/waterresources/map/WaterResourcesExplorer.aspx.

Ecology (Washington State Department of Ecology) and DEQ (Oregon Department of Environmental Quality). 2002. *Total Maximum Daily Load Plan for Lower Columbia River Total Dissolved Gas.* Accessed December 20, 2018. http://pweb.crohms.org/tmt/wqnew/tmdl/2002_Lower_Columbia_TDG_TMDL.pdf.

Ecology and Environment, Inc. 2006. *Windy Point Wind Farm, Klickitat County, Washington: Environmental Report*. Portland, Oregon.

Ecosphere Environmental Services. 2007. *Golden Eagle Monitoring at Carbon Mountain: Final Summary Report for the 2003-07 Breeding Seasons*. U.S. Bureau of Reclamation, Western Colorado Area Office, Animas-La Plata Project, Durango, Colorado.

Eisner, S. A. 1991. "*Bald Eagles Wintering along the Columbia River in Southcentral Washington: Factors Influencing Distribution and Characteristics of Perch and Roost Trees," thesis*. The University of Montana.

Erickson, W. P., G. D. Johnson, M. D. Strickland, and K. Kronner. 1999. *Avian Baseline Study at the Proposed CARES Wind Plant.* National Renewable Energy Laboratory/Subcontract Report-500-26902. Goldendale, WA.

FEMA (Federal Emergency Management Agency). 1998. *W3 Flood Data, Klickitat, WA ARC/INFO coverage*. Accessed May 14, 2015. https://web.archive.org/web/20150423154928/http://www.ecy.wa.gov/services/gis/data/inlandWaters/flood/flood.htm.

Gervais, J. 2017. *Conservation Assessment for the Townsend's Big-Eared Bat (*Corynorhinus townsendii*) in Oregon and Washington*. Oregon Wildlife Institute. Accessed June 2019. https://webcache.googleusercontent.com/search?q=cache:EBGUwZVGUFkJ:https://www.fs.fed.us/r6/sfpnw/issssp/documents4/ca-ma-corynorhinus-townsendii-2017-03.docx+&cd=4&hl=en&ct=clnk&gl=us.

GeoPro LLC. 2017. *Groundwater Monitoring Report: West Surface Impoundment Columbia Gorge Aluminum Smelter Site*.

Haworth, P. F., M. J. McGrady, D. P. Whitfield, A. H. Fielding, and D. R. A. McLeod. 2010. "*Ranging Distance of Resident Golden Eagles* Aquila chrysaetos *in Western Scotland According to Season and Breeding Status: Capsule Home-range of Resident Pairs of Golden Eagle was usually Smaller during a Successful Breeding Season than during Winter and during an Unsuccessful Breeding Season*." Bird Study 53: 265–273.

HDR. 2019. *Goldendale Energy Storage Project Conceptual Arrangement Summary Report.*

Highland Economics. 2019. *Economic and Fiscal Impact Analysis of the Goldendale Pumped Storage Project*.

Jordan, S.F. and S.H. Black. 2014. *Conservation Assessment for Monadenia Fidelis minor Dalles Sideband*. USDA Forest Service and USDI Bureau of Land Management. Accessed January 2019. https://www.fs.fed.us/r6/sfpnw/issssp/documents3/ca-ig-monadenia-fidelis-minor-201412-508.pd.

_____. 2015. *Conservation Assessment for Cryptomastix hendersoni, Columbia Oregonian*. USDA Forest Service Region 6 and USDI BLM, Oregon and Washington Interagency Special Status and Sensitive Species Program. Accessed June 2019. https://www.fs.fed.us/r6/sfpnw/issssp/documents3/ca-ig-cryptomastix-hendersoni-201504-508.pdf.

Judd, R. 2012. "*What a Big Bunch of Garbage: But Roosevelt Landfill Turns it Into Power*." The Seattle Times.

Kempenaers et al. 2010. Current Biology, Volume 20, Issue 19. Pages 1735-1739. Artificial Night Lighting Affects Dawn Song, Extra-Pair Siring Success, and Lay Date in Songbirds. Accessed November 2019 https://www.sciencedirect.com/science/article/pii/S0960982210010183.

Klickitat County. 2013. *Ordinance No. O080613: An Ordinance of Klickitat County, Washington Relating to Land Use and Zoning; Critical Area Review and Evaluation Consistent with the Growth Management Act (GMA); and Amending Ordinance No. O012704*. Klickitat County, Washington.

_____. 2017. *Klickitat County Noxious Weed List, Washington State Noxious Weed Control Board*. Accessed January 2019. https://www.klickitatcounty.org/575/Klickitat-County-Weed-List-PDF.

Klickitat County Planning. 2004. *Klickitat County Energy Overlay Environmental Impact Statement*. Accessed October 2014. https://web.archive.org/web/20151020060656/http://www.klickitatcounty.org/planning/ContentROne.asp?fContentIdSelected=2119658607&fCategoryIdSelected=948111261.

Klute, D. S., L. W. Ayers, M. T. Green, W. H. Howe, S. L. Jones, J. A. Shaffer, S. R. Sheffield, and T. S. Zimmerman. 2003. *Status Assessment and Conservation Plan for the Western Burrowing Owl in the United States*. U.S. Department of Interior, Fish and Wildlife Service, Biological Technical Publication FWS/BTP-R6001-2003, Washington, D.C. Accessed June 2019. https://www.fws.gov/mountain-prairie/migbirds/species/birds/wbo/Western%20Burrowing%20Owlrev73003a.pdf.

KPUD (Public Utility District No. 1 of Klickitat County). 2012. *Application for a Preliminary Permit (Successive) for the Goldendale Energy Storage Hydroelectric Project, Originally P-13333*. Goldendale, Washington.

Lang, B. 2008. *Columbia River*. Center for Columbia River History.

Larsen, E., J. M. Azerrad, N. Nordstrom, editors. 2004. *Management recommendations for Washington's priority species, Volume IV: Birds*. Washington Department of Fish and Wildlife, Olympia, Washington, USA. Accessed June 2019. https://wdfw.wa.gov/sites/default/files/publications/00026/wdfw00026.pdf.

Lasmanis, R. and T. Hall, 1985. *A Geologic Feasibility Study for the Superconducting Super Collider, Open File Report 85-3, Washington State Department of Natural Resources*. Division of Geology and Earth Sciences.

Madders, M., and D. P. Whitfield. 2006. *Upland Raptors and the Assessment of Wind Farm Impacts*. *Ibis* 148: 43-56.

McClure, D. 2011. *Wind Energy Permitting in Klickitat County, Washington*. Northwest Wind Energy and Wildlife Workshop Presentation. Accessed October 2014. http://greatbasin.wr.usgs.gov/windenergyws/Content/docs/Session2/6_Dave_McClure%20Klickitat%20Co%20Permitting.pdf.

McPhail, J. D. 2007. *The Freshwater Fishes of British Columbia*. Edmonton, AB: University of Alberta Press.

Mellen-McLean, K., B. Wales, and B. Bresson. 2013. *A Conservation Assessment for the White-headed woodpecker (*Picoides albolarvatus*)*. USDA Forest Service, Region 6, USDI BLM, Oregon and Washington. Accessed June 2019. https://www.fs.fed.us/r6/sfpnw/issssp/documents2/ca-bi-picoides-albolarvatus-2013-08-07.pdf.

Miller, J. and C. Voight. 2011. Callophrys gryneus nr. Chalcosiva *Species Fact Sheet*. Accessed June 2019. https://www.fs.fed.us/r6/sfpnw/issssp/documents2/sfs-iile-callophrys-gryneus-nr-chalcosiva-2012-02.doc.

Millsap, B.A., T.G. Grubb, R.K. Murphy, T. Swem, and J.W. Watson. 2015. *Conservation Significance of Alternative Nests of Golden Eagles*. Global Ecology and Conservation 3:234-241.

National Audubon Society. 2015a. *Columbia Hills IBA Website*. Accessed May 19, 2015. http://netapp.audubon.org/iba/site/300.

_____. 2015b. *Important Bird Areas: A Valuable Tool for Protecting the Places most Crucial to Birds*. Accessed November 11, 2019. https://wa.audubon.org/sites/default/files/ibas_policyuse.pdf

NOAA (National Oceanic and Atmospheric Administration). 2019. *Coastal Zone Management Programs*. Accessed May 28, 2019. https://coast.noaa.gov/czm/mystate/.

NPS (National Park Service). 1997. *National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation*. Accessed December 2019. https://www.nps.gov/subjects/nationalregister/upload/NRB-15_web508.pdf

_____. 2014a. *Oregon National Historic Tail*. Accessed October 13, 2014. http://www.nps.gov/oreg/index.htm.

_____. 2014b. *National NAGPRA Online Databases, Native American Consultation Database*. Accessed October 9, 2014. https://web.archive.org/web/20140205045807/http://grants.cr.nps.gov:80/nacd/index.cfm.

_____. 2015. *Lewis and Clark National Historic Trail Website*. Accessed May 15, 2015. http://www.nps.gov/lecl/index.htm.

NRCS (Natural Resources Conservation Services). 2005b. *Mid-Columbia/Hood—017070105 8-Didgit Hydrologic Unit August 2005 Profile*. Accessed October 2014. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_040432.pdf.

_____. 2019. *Web Soil Survey*. Accessed December 2018. https://websoilsurvey.sc.egov.usda.gov/.

OBIC (Oregon Biodiversity Information Center). 2019. *Oregon Rare, Threatened and Endangered Species Publications*. Accessed June 19, 2019. https://inr.oregonstate.edu/orbic/rare-species/rare-species-oregon-publications.

ODFW (Oregon Department of Fish and Wildlife). 2014. *Letter Response to Request for Information Addressed to Brian Skeahan, Signed by Elizabeth A. O. Moats, East Region Hydropower Coordinator on 30 October 2014*. RE: Request for Information Relevant to Proposed John Day Pumped Storage Hydroelectric Project, FERC No P-13333.

_____. 2017. *Compass: Mapping Oregon's Wildlife Habitats: An Online Data and Planning Tool*. Accessed December 2018. https://www.dfw.state.or.us/maps/compass/.

_____. 2018. *ODFW Threatened, Endangered, and Candidate Fish and Wildlife Species in Oregon 2018*. Accessed January 2019. https://www.dfw.state.or.us/wildlife/diversity/species/threatened_endangered_candidate_list.asp.

_____. 2019. *Species Information*. Accessed January 2019. https://myodfw.com/wildlife-viewing.

Oregon Department of Revenue. 2019 Edition. *Oregon Personal Income Tax Statistics: Characteristics of Filers.* Salem: Oregon Department of Revenue.

Oregon State Parks. 2014. *Deschutes River State Recreation Area*. Accessed October 14, 2014. http://www.oregonstateparks.org/index.cfm?do=parkPage.dsp_parkPage&parkId=29.

Oregon Water Resources Department. 2014. *Water Rights Mapping Tool*. Accessed October 10, 2014. http://apps.wrd.state.or.us/apps/gis/wr/Default.aspx.

Pagel, J.E., D. M. Whittington, and G. T. Allen. 2010. *Interim Golden Eagle Technical Guidance: Inventory and Monitoring Protocols; and Other Recommendations in Support of Eagle Management and Permit Issuance*. Division of Migratory Bird Management. U.S. Fish and Wildlife Service. Washington, D.C., USA.

Parametrix. 2004. *West Surface Impoundment Closure and Post Closure Plan*. Prepared by Parametrix for Goldendale Aluminum Company. November.

Phillips, W.M., and Walsh, T.J. 1987. *Geologic Map of the Northwestern Part of the Goldendale Quadrangle, Washington*. Washington Division of Geology and Earth Resources Open File Report 87-13. Revised November 1987.

PNSN (Pacific Northwest Seismic Network). 2019. *Website Database Search*. Accessed January 7, 2019. https://pnsn.org/.

PSU (Portland State University). 2007. *Middle Columbia River Aquatic Nonindigenous Species Survey*. Final Report. Accessed June 2019. http://www.aquaticnuisance.org/wordpress/wp-content/uploads/2009/01/MCRANS_Final_Rprt.pdf.

Reidel, S.P., K.R. Fecht, M.C. Hagood, and T.L. Tolan. 1989. "*The Geologic Evolution of the Central Columbia Plateau*." In *Volcanism and Tectonism in the Columbia River Flood-basalt Province*, edited by S.P. Reidel and P.R. Hooper. Boulder, Colorado: Geological Society of America.

Renewable Northwest. 2018. *Renewable Energy in Washington*. Accessed December 2018. https://renewablenw.org/sites/default/files/pdfs/Renewable%20Energy%20in%20Washington%202018OCT25r.pdf.

Rocchio, J., and R. Crawford. 2009. *Field Guide to Washington's Ecological Systems*. Washington Natural Heritage Program.

Ross, C. 2009. *Klickitat County Gets its Wind Back*. Yakima Herald-Republic. Accessed October 2014. http://www.cannonpowergroup.com/news/klickitat-county-gets-its-wind-back/

Sager. 1989. "*John Day Dam*." In *Engineering Geology in Washington, Volume I. Washington Division of Geology and Earth Resources Bulletin*.

Sehmel, GA. 1984. "*Deposition and Resuspension*." In *Atmospheric Science and Power Production*, edited by D R Anderson. DOE/TIC-27601. U.S. Department of Energy, Washington, D.C.

Shannon & Wilson, Inc. 2002. *Geotechnical Report, Cliffs Project, Goldendale, Washington*. Submitted to Goldendale Aluminum Company. March 12, 2002.

Shellenberger, J. 2019. *A Cultural Resource Survey of the Goldendale Energy Project No. 14861, Prepared for Rye Development*. Yakama Nation Cultural Resource Program.

Sherman County. 2017. *Weed District Sherman County Noxious Weeds*. Accessed January 2019. https://www.co.sherman.or.us/noxious-weeds-sherman-county/.

Titus, T. 2019. *Amphibians and Reptiles of Oregon Range Maps*. University of Oregon. Accessed January 2019. https://pages.uoregon.edu/titus/herp/rangemaps.html.

University of Montana. 2019. *Wilderness Connect online mapper*. Accessed May 27, 2019. https://umontana.maps.arcgis.com/apps/webappviewer/index.html?id=a415bca07f0a4bee9f0e894b0db5c3b6.

USACE (U.S. Army Corps of Engineers). 2014. *John Day Recreation*. US Army Corps of Engineers, Portland District. Accessed October 13, 2014. http://www.nwp.usace.army.mil/Locations/ColumbiaRiver/JohnDay.aspx.

_____. 2018. *John Day Lock and Dam*. Accessed December 2018. https://www.nwp.usace.army.mil/John-Day/.

U.S. Census Bureau. 2018. *Community Facts*. Accessed December 2018. https://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml.

U.S. Climate Data. 2018. *Climate Goldendale—Washington*. Accessed November 30, 2018. https://www.usclimatedata.com/climate/goldendale/washington/united-states/uswa0514.

USEPA (United States Environmental Protection Agency). 1991. *Total Maximum Daily Loading (TMDL) to Limit Discharges of 2,3,7,8-TCDD (Dioxin) to the Columbia River Basin*.

_____. 2019. *Glossary of Terms*. Accessed October 2019. https://www.epa.gov/sites/production/files/2016-02/documents/realestate_glossary.pdf.

USFS (United States Department of Agriculture Forest Service). 2014. *Gifford Pinchot National Forest, Recreation*. Accessed October 13, 2014. http://www.fs.usda.gov/recmain/giffordpinchot/recreation.

USFWS (United States Fish and Wildlife Service). 2007. *National Bald Eagle Management Guidelines*. Division of Migratory Bird Management. U.S. Fish and Wildlife Service. Washington, D.C.

_____. 2013. *Listed and Proposed Endangered and Threatened Species and Critical Habitat; Candidate Species; and Species of Concern in Klickitat County*.

_____. 2014. *Letter Response to Request for Information Addressed to Brian Skeahan, Signed by Thomas L. McDowell, Acting Manager, Washington Fish and Wildlife Office on November 24, 2014*. FWS Response to Request for Existing Information Relevant to the Development of a License Application for the Proposed John Day Pumped Storage Hydroelectric Project, FERC Project No. P13333-000.

_____. 2018a. *USFWS Federally Listed, Proposed, Candidate, Delisted Species and Species of Concern under USFWS Jurisdiction which May Occur in Oregon 2018*. Accessed December 2018. https://www.fws.gov/endangered/.

_____. 2018b. *Northern Spotted Owl*. Accessed December 2018. https://www.fws.gov/oregonfwo/articles.cfm?id=149489595.

_____. 2018c. *Oregon Spotted Frog*. Accessed December 2018. https://www.fws.gov/oregonfwo/articles.cfm?id=149489458.

_____. 2019a. *National Wetland Inventory*. Accessed 2019. https://www.fws.gov/wetlands/data/data-download.html.

_____. 2019b. *Environmental Conservation Online System*. Multiple species pages. Accessed June 19, 2019. https://ecos.fws.gov/ecp/.

_____. 2019c. *USFWS Federally Listed, Proposed, Candidate, Delisted Species and Species of Concern under USFWS Jurisdiction which May Occur in Oregon 2019*. Accessed June 19, 2019. https://www.fws.gov/endangered/.

_____. 2019d. *USFWS Federally Listed, Proposed, Candidate, Delisted Species and Species of Concern under USFWS Jurisdiction which May Occur in Washington 2019*. Accessed June 19, 2019. https://www.fws.gov/endangered/.

USGS. 2019. *National Hydrography Data Set*. Accessed January 2019. https://water.usgs.gov/GIS/huc.html.

UW (University of Washington). 2018. *Mammals of Washington*. Accessed January 2019. http://www.burkemuseum.org/research-and-collections/mammalogy/collections/mamwash/soricomorpha.php#Prebles_Shrew.

WAESD (Washington State Employment Security Department). 2017. *Klickitat County Profile*. Accessed December 2018. https://esd.wa.gov/labormarketinfo/county-profiles/klickitat.

Ward, D.L. 2001. *Draft Mainstem Columbia River Subbasin Summary*. Northwest Power Planning Council. March 2001.

Washington State Department of Revenue. 2019. *Local Sales & Use Tax Rates*. Retrieved from Washington State Department of Revenue: https://dor.wa.gov/get-form-or-publication/publications-subject/local-sales-use-tax-rates-excel-format.

Washington State Parks. 2014a. *Maryhill State Park*. Accessed October 14, 2014. https://www.parks.state.wa.us/543/Maryhill.

_____. 2014b. *Goldendale Observatory State Park*. Accessed October 14, 2014. https://www.parks.state.wa.us/512/Goldendale-Observatory.

Watson, J. 2015. *Personal Communication from J. Watson, WDFW/Wildlife Research Scientist*. March 18, 2015.

_____. 2019. *Personal Communication from J. Watson, WDFW/Wildlife Research Scientist*. September 18, 2019.

Watson, J.W., and J. Pierce. 1998. *Skagit River Bald Eagles: Movements, Origins, and Breeding Population Status*. Accessed January 2019. https://wdfw.wa.gov/publications/00337/wdfw00337.pdf.

Watson, J.W., and M. Whalen. 2003. "*Golden Eagle (*Aquila chrysaetos*)*." In *Management Recommendations for Washington's Priority Species, Volume IV*, edited by E. M. Larsenand and N. Nordstrom, 8-1–8-7. Olympia Washington: Washington Department of Fish and Wildlife.

Watson, J.W., and R.W. Davies. 2009. *Range Use and Contaminants of Golden Eagles in Washington*. Progress Report. Washington Department of Fish and Wildlife Program, Wildlife Science Division. Accessed January 2019. https://wdfw.wa.gov/publications/00134/wdfw00134.pdf.

Watson, J.W., R. Marheine, and T. Fitzhenry. 2014a. *Focal Activity of Nesting Golden Eagles Near Unused Nests*. Journal of Raptor Research 48:284–288.

Watson, J. W., A. A. Duff, and R. W. Davies. 2014b. *Home Range and Resource Election by GPS-monitored Adult Golden Eagles in the Columbia Plateau Ecoregion: Implications for Wind Power Development.* The Journal of Wildlife Management 6:1012–1021.

WDFW (Washington Department of Fish & Wildlife). 1996. *Washington State Recovery Plan for the Ferruginous Hawk*. Olympia, WA, 63pp. Accessed June 2019. https://wdfw.wa.gov/sites/default/files/publications/01336/wdfw01336.pdf.

_____. 1999. *Washington State Status Report for the Mardon Skipper*. October. Accessed November 8, 2019. https://wdfw.wa.gov/sites/default/files/publications/00376/wdfw00376.pdf.

_____. 2005. *Washington's Comprehensive Wildlife Conservation Strategy*. September 2005. Accessed June 2019. https://wdfw.wa.gov/sites/default/files/publications/00727/wdfw00727.pdf.

_____. 2006. *Mount St. Helens Elk Herd Plan*. Wildlife Management Program, Washington Department of Fish and Wildlife, Olympia. 52 pp. Accessed June 2019. https://wdfw.wa.gov/sites/default/files/publications/00771/wdfw00771.pdf.

_____. 2012. *Threatened and Endangered Wildlife State of Washington Annual Report 2012*. Accessed January 2019. https://wdfw.wa.gov/publications/01542/wdfw01542.pdf.

_____. 2013. *State of Washington Bat Conservation Plan*. Accessed January 2019. https://wdfw.wa.gov/publications/01504/wdfw01504.pdf.

_____. 2014a. *WDFW Lands, Klickitat Wildlife Area*. Accessed October 10, 2014. http://wdfw.wa.gov/lands/wildlife_areas/klickitat/Goldendale%20Hatchery/.

_____. 2014b. *Birding in and around Klickitat County: Sites for Access Viewing and Birding*. Accessed October 16, 2014. https://web.archive.org/web/20141016043157/http://wdfw.wa.gov/viewing/guides/klickitat/.

_____. 2014c. *Letter Response to Request for Information Addressed to Brian Skeahan, Signed by Patrick Verhey, WDFW Hydroelectric Mitigation Biologist on 28 October 2014.* RE: Request for Information Relevant to Proposed John Day Pumped Storage Hydroelectric Project, FERC No. 13333.

_____. 2014d. *Golden Eagle #413 John Day Dam 2014*. WDFW Wildlife Program Region 5, Klickitat County.

_____. 2015a. Washington State Species of Concern Lists. State Candidate Species. Accessed May 7, 2015. http://wdfw.wa.gov/conservation/endangered/status/SC/.

_____. 2015b. Conservation: Priority Habitats and Species (PHS). Accessed May 12, 2015 http://wdfw.wa.gov/mapping/phs/.

_____. 2015c. *RFI response letter*. Additional study request for the Proposed John Day Pumped Storage Hydroelectric Project, FERC No. 13333. Patrick Verhey, WDFW April 2, 2015.

_____. 2015d. *Washington's State Wildlife Action Plan: 2015 Update*. Washington Department of Fish and Wildlife, Olympia, Washington, USA. Accessed June 2019. https://wdfw.wa.gov/sites/default/files/publications/01742/wdfw01742.pdf.

_____. 2016. *Washington State Mule Deer Management Plan, Wildlife Program, WDFW, Olympia, WA, USA*. 144p. Accessed June 2019. https://wdfw.wa.gov/sites/default/files/publications/01755/wdfw01755.pdf.

_____. 2018a. *State of Washington Priority Habitats and Species List*. August 2008, Updated September 2018. Accessed December 4, 2018. https://wdfw.wa.gov/publications/00165/wdfw00165.pdf.

_____. 2018b. *State of Washington Priority Habitats and Species on the Web*. August 2008, Updated September 2018. Accessed December 4, 2018. http://apps.wdfw.wa.gov/phsontheweb/.

_____. 2018c. *Washington State Species of Concern Lists*. Accessed December 4, 2018. https://web.archive.org/web/20181127031700/https://wdfw.wa.gov/conservation/endangered/All/ /.

_____. 2019a. *Appendix 2 (Excel Data) of State of Washington Priority Habitats and Species List*. Accessed June 19, 2019. https://wdfw.wa.gov/publications/00165.

_____. 2019b. *WDFW comment letter on the Pre-Application Document*. Dated May 28, 2019.

_____. 2019c. *Golden Eagle #413 John Day Dam 2019*. WDFW Wildlife Program Region 5, Klickitat County.

_____. 2019d. *Prairie falcon #288 John Day Dam 2019*. WDFW Wildlife Program Region 5, Klickitat County.

_____. 2019e. *Wildlife Areas*. Accessed September 2019. https://wdfw.wa.gov/places-to-go/wildlife-areas.

_____. 2019f. *Living with Wildlife: Deer*. Accessed June 2019. https://wdfw.wa.gov/species-habitats/living/species-facts/deer#.

WEST (Western EcoSystems Technology, Inc.). 2006. *Analysis of Potential Wildlife Impacts from the Windy Point Wind Energy Project, Klickitat County, Washington*. Windy Point Partners, LLC. February 3, 2006.

_____. 2008. *Winter Bird Use Studies and Avian and Bat Impact Assessment for the Windy Point II Wind Resource Area Klickitat County, Washington.* Final Report February 1–March 26, 2008. Windy Point Partners, LLC. September 14, 2008.

Wiles, G. J. 2016. *Periodic status review for the western gray squirrel in Washington.* Washington Department of Fish and Wildlife, Olympia, Washington. 19 + iii pp. Accessed June 2019. https://wdfw.wa.gov/sites/default/files/publications/01758/wdfw01758.pdf.

Wiles, G. J., and K. S. Kalasz. 2017. *Status report for the Yellow-billed Cuckoo in Washington*. Washington Department of Fish and Wildlife, Olympia, Washington. 32+ iv pp. Accessed June 2019. https://wdfw.wa.gov/sites/default/files/publications/01881/wdfw01881.pdf.

Wiles, G. J., H. L. Allen, and G. E. Hayes. 2011. *Wolf conservation and management plan for Washington*. Washington Department of Fish and Wildlife, Olympia, Washington. 297 pp. Accessed June 2019. https://wdfw.wa.gov/sites/default/files/publications/00001/wdfw00001.pdf.

Wiltscko, W., Munro, U., Ford, H. & Wiltschko, R. 1993. *Red light disrupts magnetic orientation of migratory birds*. Nature 364, 525–527.

WNHP (Washington Natural Heritage Program). 2015. *Natural Heritage Program*. https://www.dnr.wa.gov/natural-heritage-program.

_____. 2018. *2018 Washington Vascular Plant Species of Special Concern*. Washington Natural Heritage Program, June 20, 2018. Natural Heritage Report 2018-04.1. Accessed December 3, 2018. https://www.dnr.wa.gov/publications/amp_nh_vascular_ets.pdf?m4cii4

Wong, I., Silva, W., Bott, J., Wright, D., Thomas, P., Gregor, N., Li, S., Mabey, M., Sojourner, A., and Wang, Y. 2000. *Earthquake Scenario and Probabilistic Ground Shaking Maps for the Portland, Oregon, Metropolitan Area*. State of Oregon Department of Geology and Mineral Industries Interpretive Map Series IMS-16.

_____. 2014. *Lewis and Clark Trail Scenic Byway*. Accessed October 13, 2014. https://web.archive.org/web/20140709150153/http://www.wsdot.wa.gov/LocalPrograms/ScenicByways/LewisAndClark.htm.

_____. 2016. *2016 Annual Traffic Report*. Accessed December 2018. https://www.wsdot.wa.gov/mapsdata/travel/pdf/Annual_Traffic_Report_2016.pdf.

Yakama Nation. 2019a. *Public Hunting and Fishing Season and Regulations 2019–20*. Accessed June 2019. https://www.ynwildlife.org/huntingseasonandregs.php.

_____. 2019b. *Hunting Information for Tribal Members*. Accessed June 2019. https://www.ynwildlife.org/tribalhunting.php.

ATTACHMENT 1:

FISH SPECIES TABLES

Table 1: Fish Species Known to Occur in John Day Reservoir

Species Common Name	Scientific Name	Life History			Origin	
		Anadromous	Adfluvial	Resident	Native	Invasive/Introduced
American shad	*Alosa sapidissima*	X				X
Black bullhead	*Ameiurus melas*			X		X
Black crappie	*Pomoxis nigromaculatus*			X		X
Bluegill	*Lepomis macrochirus*			X		X
Bridgelip sucker	*Catostomus columbianus*			X	X	
Brown bullhead	*Ameiurus nebulosus*			X		X
Brown trout	*Salmo trutta*			X		X
Bull trout	*Salveliunus confluentus*		X	X	X	
Burbot	*Lota lota*			X	X	
Channel catfish	*Ictalurus punctatus*			X		X
Chinook salmon	*Oncorhynchus tshawytscha*	X			X	
		X			X	
		X			X	
Chiselmouth	*Acrocheilus alutaceus*			X	X	
Coho salmon	*Oncorhynchus kisutch*	X			X	
Common carp	*Cyprinus carpio*			X		X
Cutthroat trout	*Oncorhynchus clarki*			X	X	
Grass carp	*Ctenopharyngodon idella*			X		X
Goldfish	*Carrassius auratus*			X		X
Lake whitefish	*Coregonus clupeaformis*			X		X
Largemouth bass	*Micropterus salmoides*			X		X
Largescale sucker	*Catostomus macrocheilus*			X	X	
Leopard dace	*Rhinichthys falcatus*			X	X	
Longnose dace	*Rhinichthys cataractae*			X	X	
Longnose sucker	*Catostomus catostomus*			X	X	
Mosquitofish	*Gambusia affinis*			X		X
Mottled sculpin	*Cottus bairdi*			X	X	
Mountain sucker	*Catostomus platyrhynchus*			X	X	
Mountain whitefish	*Prosopium williamsoni*			X	X	

Species Common Name	Scientific Name	Life History			Origin	
		Anadromous	Adfluvial	Resident	Native	Invasive/Introduced
Northern pikeminnow	*Ptychocheilus oregonensis*			X	X	
Pacific lamprey	*Entosphenus tridentata*	X			X	
Paiute sculpin	*Cottus beldingi*			X	X	
Peamouth	*Mylocheilus caurinus*			X	X	
Prickly sculpin	*Cottus asper*			X	X	
Pumpkinseed	*Lepomis gibbosus*			X		X
Rainbow trout	*Oncorhynchus mykiss*			X	X	
Redside shiner	*Richardsonius balteatus*			X	X	
Reticulate sculpin	*Cottus perplexus*			X	X	
River lamprey	*Lampetra ayresi*	X			X	
Sandroller	*Percopsis transmontana*			X	X	
Smallmouth bass	*Micropterus dolomieu*			X		X
Sockeye salmon	*Oncorhynchus nerka*	X			X	
Speckled dace	*Rhinichthy osculus*			X	X	
Steelhead	*Oncorhynchus mykiss*	X			X	
		X			X	
		X			X	
Tench	*Tinca tinca*			X		X
Three-spine stickleback	*Gasterosteus aculeatus*			X	X	
Torrent sculpin	*Cottus rhotheus*			X	X	
Walleye	*Sander vitreus*			X		X
Warmouth	*Lepomis gulosis*			X		X
Western brook lamprey	*Lampetra richardsoni*			X	X	
White crappie	*Pomoxis annularis*			X		X
White sturgeon	*Acipenser transmontanus*		X	X	X	
Yellow bullhead	*Ameiurus natalis*			X		X
Yellow perch	*Perca flavescens*			X		X

Sources: Ward 2001; McPhail 2007

Blank cells indicate not applicable

Table 2: Habitat Availability for Anadromous, Resident, and Introduced Fish Species within John Day Reservoir

Species Common Name	Scientific Name	Habitat by Life Stage in John Day Reservoir				
		Migration	Spawning	Rearing	Incubation	Overwintering
American shad	*Alosa sapidissima*	X	X	X	X	X
Black bullhead	*Ameiurus melas*	X	X	X	X	X
Black crappie	*Pomoxis nigromaculatus*	X	X	X	X	X
Bluegill	*Lepomis macrochirus*	X	X	X	X	X
Bridgelip sucker	*Catostomus columbianus*	X	X	X	X	X
Brown bullhead	*Ameiurus nebulosus*	X	X	X	X	X
Brown trout	*Salmo trutta*	X				X
Bull trout	*Salveliunus confluentus*	X				
Burbot	*Lota*	X	X	X	X	X
Channel catfish	*Ictalurus punctatus*	X	X	X	X	X
Chinook salmon	*Oncorhynchus tshawytscha*	X				
Chiselmouth	*Acrocheilus alutaceus*	X	X	X	X	X
Coho salmon	*Oncorhynchus kisutch*	X				
Common carp	*Cyprinus carpio*	X	X	X	X	X
Cutthroat trout	*Oncorhynchus clarki*	X	X	X	X	X
Goldfish	*Carrassius auratus*	X	X	X	X	X
Grass carp	*Ctenopharyngodon idella*	X	X	X	X	X
Lake whitefish	*Coregonus clupeaformis*	X	X	X	X	X
Largemouth bass	*Micropterus salmoides*	X	X	X	X	X
Largescale sucker	*Catostomus macrocheilus*	X	X	X	X	X
Leopard dace	*Rhinichthys falcatus*	X		X		X
Longnose dace	*Rhinichthys cataractae*	X	X	X	X	X
Longnose sucker	*Catostomus catostomus*	X	X	X	X	X
Mosquitofish	*Gambusia affinis*	X	X	X	X	X
Mottled sculpin	*Cottus bairdi*	X	X	X	X	X
Mountain sucker	*Catostomus platyrhynchus*	X	X	X	X	X
Mountain whitefish	*Prosopium williamsoni*	X				X
Northern pikeminnow	*Ptychocheilus oregonensis*	X	X	X	X	X

Species Common Name	Scientific Name	Habitat by Life Stage in John Day Reservoir				
		Migration	Spawning	Rearing	Incubation	Overwintering
Pacific lamprey	*Entosphenus tridentatus*	X				
Paiute sculpin	*Cottus beldingi*	X	X	X	X	X
Peamouth	*Mylocheilus caurinus*	X	X	X	X	X
Prickly sculpin	*Cottus asper*	X	X	X	X	X
Pumpkinseed	*Lepomis gibbosus*	X	X	X	X	X
Rainbow trout	*Oncorhynchus mykiss*	X		X		X
Redside shiner	*Richardsonius balteatus*	X	X	X	X	X
Reticulate sculpin	*Cottus perplexus*	X	X	X	X	X
River lamprey	*Lampetra ayresi*	X				X
Sandroller	*Percopsis transmontana*	X	X	X	X	X
Smallmouth bass	*Micropterus dolomieu*	X	X	X	X	X
Sockeye salmon	*Oncorhynchus nerka*	X				
Speckled dace	*Rhinichthy osculus*	X	X	X	X	X
Steelhead	*Oncorhynchus mykiss*	X				
Tench	*Tinca tinca*	X	X	X	X	X
Three-spine stickleback	*Gasterosteus aculeatus*	X	X	X	X	X
Torrent sculpin	*Cottus rhotheus*	X	X	X	X	X
Walleye	*Sander vitreus*	X	X	X	X	X
Warmouth	*Lepomis gulosis*	X	X	X	X	X
Western brook lamprey	*Lampetra richardsoni*	X				X
White crappie	*Pomoxis annularis*	X	X	X	X	X
White sturgeon	*Acipenser transmontanus*	X		X		X
Yellow bullhead	*Ameiurus natalis*	X	X	X	X	X
Yellow perch	*Perca flavescens*	X	X	X	X	X

Sources: Ward 2001

Blank cells indicate not applicable

ATTACHMENT 2:

PHOTO LOG

Photo 1: View of Proposed Lower Reservoir Area from State Route 14

Photo 2: View in Vicinity of the Proposed Upper Reservoir

Photo 3: View Near the Lower Reservoir Location Looking Southwest.

Landscape photograph showing the river valley, plateau, waterbody, and developed area from lower plateau near the proposed location of the lower reservoir looking southwest toward the town of Rufus.

Photo 4: View Near the Upper Reservoir Location Looking Southwest.

Landscape photograph showing the river valley, plateau, waterbody, and developed area from Juniper Point near the proposed location of the upper reservoir looking southwest.

Photo 5: View Near the Proposed Upper Reservoir Looking Southeast.

Landscape photograph showing the river valley, plateau, waterbody, and developed area from Juniper Point near the proposed location of the upper reservoir looking southeast.

Photo 6: View Near the Proposed Upper Reservoir Looking Northwest.

Landscape photograph showing the upper plateau and developed area from the Columbia Hills near the proposed location of the upper reservoir looking northwest toward the town of Goldendale.

Photo 7: KOP 1, taken April 2015

X Coord NAD 83	Y Coord NAD 83	Z Coord NAD 83	Latitude	Longitude
1557940.703	161950.8873	1719.01416	45.77697	-120.823

Photo 8: KOP 2, taken April 2015

X Coord NAD 83	Y Coord NAD 83	Z Coord NAD 83	Latitude	Longitude
1584477.104	163145.8012	1908.345093	45.780501	-120.719242

Photo 9: KOP 3, taken April 2015

X Coord NAD 83	Y Coord NAD 83	Z Coord NAD 83	Latitude	Longitude
1581528.709	148092.5996	3019.478516	45.739198	-120.730625

Photo 10: KOP 4, taken April 2015

X Coord NAD 83	Y Coord NAD 83	Z Coord NAD 83	Latitude	Longitude
1582956.895	142387.7089	950.127563	45.723565	-120.724968

Photo 11: KOP 5, taken May 2019

X Coord NAD 83	Y Coord NAD 83	Z Coord NAD 83	Latitude	Longitude
1583867.404	135269.8411	176.56311	45.704053	-120.721325

ATTACHMENT 3:

VRM WORKSHEETS

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
VISUAL CONTRAST RATING WORKSHEET

Date: April 24, 2015 and May 16, 2019
District/ Field Office: Prineville/Spokane
Resource Area: Spokane
Activity (program): Goldendale Pumped Storage

SECTION A. PROJECT INFORMATION

1. Project Name: John Day Pump Storage **2. Key Observation Point:** 1 **3. VRM Class:** N/A **Elevation:** 1719’	**4. Location** **Township:** T3N **Range:** R17E **Section:** S4	**5. Location details/Sketch:** Intersection of HW 97 and Hoctor Road 

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Undulating foothills, flat plateau.	Smooth hills, patches of trees, smooth and gentle fields	Linear roads, wind turbines, power poles, rectangular buildings
LINE	Rolling horizon line, smooth hill slopes, flat plateau	Geometric agriculture, butt edge, irregular patches on hills	Horizontal and perpendicular road bands, vertical wind turbines and power poles
COLOR	Dull soft earth tones	Natural tan, light green, and dark green on hills, light green agriculture	Yellow, grey, red, blue, and white buildings, white turbines, brown power poles, grey roads
TEX-TURE	Smooth undulating hills with grooves, smooth flat plateau	Smooth agricultural fields, smooth hills, uneven	Clustered buildings, smooth directional roads, rough power poles and wind turbines

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Crest of upper reservoir, indistinct, rectangular, linear	Unchanged	Unchanged
LINE	Regular, indistinct, converging with horizon line	Unchanged	Unchanged
COLOR	Dull tan, subtle earth monotone	Unchanged	Unchanged
TEX-TURE	Fine, uniform, continuous	Unchanged	Unchanged

SECTION D. CONTRAST RATING __SHORT TERM _X_ LONG TERM

1. DEGREE OF CONTRAST		FEATURES: LAND/WATER BODY (1) STRONG	MODERATE	WEAK	NONE	VEGETATION (2) STRONG	MODERATE	WEAK	NONE	STRUCTURES (3) STRONG	MODERATE	WEAK	NONE
ELEMENTS	FORM			X					X			X	
	LINE			X				X				X	
	COLOR				X				X				X
	TEXTURE				X			X				X	

2. Does project design meet visual resource management objectives? _X_ Yes ___No (Explain on reverses side)

3. Additional mitigating measures recommended ___Yes _X_ No (Explain on reverses side)

Evaluator’s Names	Date
M. Alves and G. Turner	4/24/2015
C. Shoemaker and J. Moffett	5/16/2019

Form 8400-4

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
VISUAL CONTRAST RATING WORKSHEET

Date: April 24, 2015 and May 16, 2019

District/ Field Office: Prineville/Spokane

Resource Area: Spokane

Activity (program): Goldendale Pumped Storage

SECTION A. PROJECT INFORMATION

1. Project Name: John Day Pump Storage
2. Key Observation Point: 2
3. VRM Class: N/A
Elevation: 1908'

4. Location
Township: T3N
Range: R17E
Section: S6

5. Location details/Sketch: Intersection of Hoctor Road and Willis Road

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Undulating foothills, flat plateau.	Patches of sparse and coarse forest, smooth and gentle fields	Linear road, fences, irrigation lines, rectangular barn, and vertical wind turbines.
LINE	Rolling horizon line, smooth hill slopes, flat plateau	Geometric agriculture, butt, digitate, and diffuse edge, irregular patches	Linear road, fences, and irrigation lines, geometric buildings, vertical wind turbines and power poles
COLOR	Dull soft earth tones	Natural tan, light green, dark green	White, grey, brown, red
TEX-TURE	Smooth undulating hills with grooves, smooth flat plateau	Smooth fields, stippled and smooth hills, patches, uneven and sparse	Smooth, rough, coarse

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Crest of upper reservoir, rectangular, linear	Unchanged	Unchanged
LINE	Linear horizon line, converging with hill slope	Unchanged	Unchanged
COLOR	Dull tan, subtle earth monotone	Unchanged	Unchanged
TEX-TURE	Uniform, fine surface, adds roughness to hills	Unchanged	Unchanged

SECTION D. CONTRAST RATING __SHORT TERM X LONG TERM

1. DEGREE OF CONTRAST		FEATURES: LAND/WATER BODY (1) STRONG	MODERATE	WEAK	NONE	VEGETATION (2) STRONG	MODERATE	WEAK	NONE	STRUCTURES (3) STRONG	MODERATE	WEAK	NONE
ELEMENTS	FORM		X					X				X	
	LINE		X					X				X	
	COLOR			X				X				X	
	TEXTURE			X				X				X	

2. Does project design meet visual resource management objectives? X Yes ___No
(Explain on reverses side)

3. Additional mitigating measures recommended
___Yes X No (Explain on reverses side)

Evaluator's Names	Date
M. Alves and G. Turner	4/24/2015
C. Shoemaker and J. Moffett	5/16/2019

Form 8400-4

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
VISUAL CONTRAST RATING WORKSHEET

Date: April 24, 2015 and May 16, 2019

District/ Field Office: Prineville/Spokane

Resource Area: Spokane

Activity (program): Goldendale Pumped Storage

SECTION A. PROJECT INFORMATION

1. Project Name: John Day Pump Storage
2. Key Observation Point: 3
3. VRM Class: N/A
Elevation: 3020'

4. Location
Township: T3N
Range: R173
Section: S28

5. Location details/Sketch: View of lower reservoir from Juniper Point

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat Plateau, undulating hills, linear and curved river, abrupt cliffs	Geometric agriculture, sparse patches of trees	Random diffuse, linear, massive
LINE	Linear, flat, vertical, horizontal	Geometric, diffuse, random	Linear, geometric, random, clustered
COLOR	Brown, red, blue	Brown, green, tan	Grey, white
TEX-TURE	Smooth, medium, rough	Smooth	Smooth, coarse, rough

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat, large, prominent, regular, rounded, small slopes and stepped slopes	Unchanged	Linear, horizontal
LINE	Curved, simple, bold, geometric, horizontal, butt edge, diagonal.	Unchanged	Weak, linear bands
COLOR	Dark red and cool monotone blue	Unchanged	Grey
TEX-TURE	Uniform, fine, medium grain stepped slope	Unchanged	Fine

SECTION D. CONTRAST RATING __SHORT TERM _X_ LONG TERM

1. DEGREE OF CONTRAST		FEATURES											
		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
		STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE
ELEMENTS	FORM		X					X				X	
	LINE		X					X				X	
	COLOR			X			X					X	
	TEXTURE			X			X					X	

2. Does project design meet visual resource management objectives? _X_ Yes ___ No (Explain on reverses side)

3. Additional mitigating measures recommended ___ Yes _X_ No (Explain on reverses side)

Evaluator's Names	Date
M. Alves and G. Turner	4/24/2015
C. Shoemaker and J. Moffett	5/16/2019

Form 8400-4

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
VISUAL CONTRAST RATING WORKSHEET

Date: April 24, 2015 and May 16, 2019

District/ Field Office: Prineville/Spokane

Resource Area: Spokane

Activity (program): Goldendale Pumped Storage

SECTION A. PROJECT INFORMATION

1. Project Name: John Day Pump Storage
2. Key Observation Point: 4
3. VRM Class: N/A
Elevation: 950'

4. Location
Township: T3N
Range: R173
Section: S28

5. Location details/Sketch: View of lower plateau from pullout on Highway 14

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Sloped and undulating hills, linear and curved river, flat plateau, abrupt cliffs	Random and irregular patches of trees, regular ground cover	Linear, broad flat, vertical
LINE	Linear, horizontal, vertical, curved	Digitate and diffuse edges, irregular patches, even ground cover	Horizontal, vertical, geometric
COLOR	Red, dull earth tones, brown	Light and dark green, brown	Grey, white, red
TEX-TURE	Smooth, coarse	Smooth, fine grain, medium roughness	Smooth, medium, coarse

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat, large, prominent, regular, rounded, small slopes and stepped slopes	Unchanged	Horizontal
LINE	Curved, simple, bold, geometric, parallel, butt edge, diagonal	Unchanged	Linear bands
COLOR	Monotone blue, dark red	Unchanged	Grey
TEX-TURE	Uniform, fine, medium grain stepped slope	Unchanged	Fine, smooth

SECTION D. CONTRAST RATING __SHORT TERM _X_ LONG TERM

1. DEGREE OF CONTRAST		FEATURES: LAND/WATER BODY (1) STRONG	MODERATE	WEAK	NONE	VEGETATION (2) STRONG	MODERATE	WEAK	NONE	STRUCTURES (3) STRONG	MODERATE	WEAK	NONE
ELEMENTS	FORM		X				X				X		
	LINE			X			X				X		
	COLOR		X			X					X		
	TEXTURE			X		X					X		

2. Does project design meet visual resource management objectives? _X_ Yes ___No (Explain on reverses side)

3. Additional mitigating measures recommended ___Yes _X_ No (Explain on reverses side)

Evaluator's Names	Date
M. Alves and G. Turner	4/24/2015
C. Shoemaker and J. Moffett	5/16/2019

Figure Form 8400

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
VISUAL CONTRAST RATING WORKSHEET

Date: April 24, 2015 and May 16, 2019

District/ Field Office: Prineville/Spokane

Resource Area: Spokane

Activity (program): Goldendale Pumped Storage

SECTION A. PROJECT INFORMATION

1. Project Name: John Day Pump Storage **2. Key Observation Point:** 5 **3. VRM Class:** N/A **Elevation:** 177’	**4. Location** **Township:** T3N **Range:** R173 **Section:** S28	**5. Location details/Sketch:** Intersection of Highway 97 and Hoctor Road 

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Sloped and undulating hills, linear, flat, abrupt cliffs	Medium, sparse, gradation	Even, clustered, sparse
LINE	Linear, undulating, horizontal, vertical	Digitate and diffuse edge, uneven, random	Vertical, horizontal, random
COLOR	Red, brown, dull earth colors, tan	Dark and light green, tan, brown	Grey, white
TEX-TURE	Smooth, coarse grain, rough	Medium grain, smooth	Rough, coarse and medium grain

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat, sloped, regular	Unchanged	Unchanged
LINE	Simple, horizontal butt edge, diagonal slope	Unchanged	Unchanged
COLOR	Dark red	Unchanged	Unchanged
TEX-TURE	Fine grain, smooth	Unchanged	Unchanged

SECTION D. CONTRAST RATING __SHORT TERM _X_LONG TERM

1. DEGREE OF CONTRAST		FEATURES: LAND/WATER BODY (1) STRONG	MODERATE	WEAK	NONE	VEGETATION (2) STRONG	MODERATE	WEAK	NONE	STRUCTURES (3) STRONG	MODERATE	WEAK	NONE
ELEMENTS	FORM			X				X					X
	LINE			X				X					X
	COLOR				X			X					X
	TEXTURE				X			X					X

2. Does project design meet visual resource management objectives? _X_Yes ___No (Explain on reverses side)

3. Additional mitigating measures recommended ___Yes _X_No (Explain on reverses side)

Evaluator’s Names	Date
M. Alves and G. Turner	4/24/2015
C. Shoemaker and J. Moffett	5/16/2019

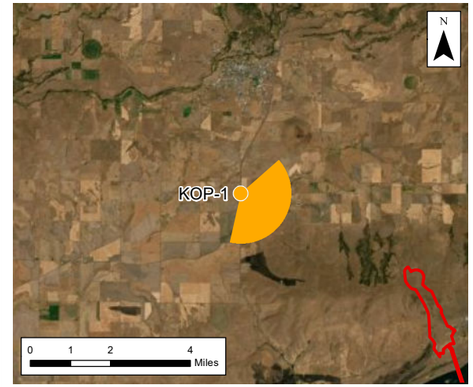
ATTACHMENT 4:

PHOTOMONTAGE

Existing View

Wireframe

Visual Simulation



Legend

- Key Observation Point (KOP) and View Angle

KOP-1
West of the intersection of Hoctor Road and Highway 97

Latitude: 45.776974
Longitude: -120.823225
State Plane Northing: 161,948.70 ft
State Plane Easting: 1,557,944.26 ft
Elevation: 1719.01 ft
Orientation: ESE
Date: 5/15/2019
Vertical Field of View: 28°
Horizontal Field of View: 144°

Figure A-1
KOP 1: Master Sheet
Draft License Application
Goldendale Energy Storage Project
Goldendale, WA

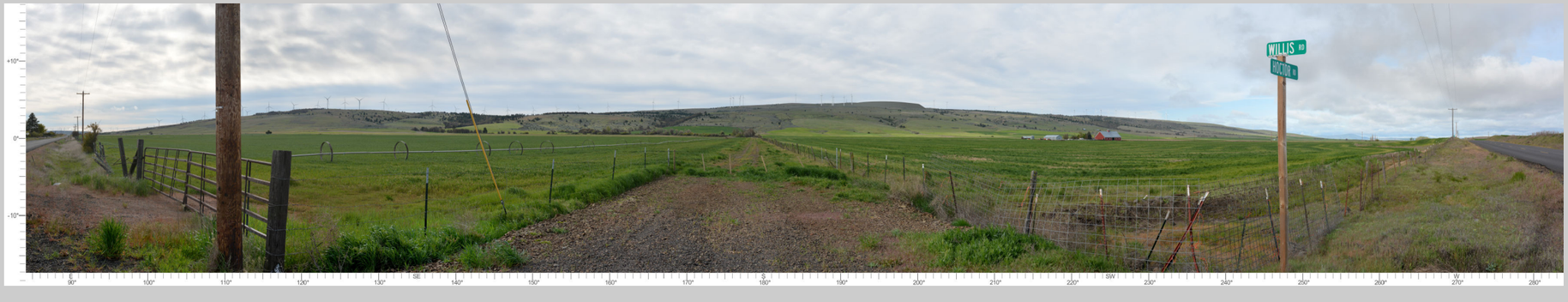
Environmental Resources Management
www.erm.com
ERM

FILE: M:\Projects\Goldendale Energy Storage Project\maps\DLA 2019\Exhibit E Section 8 Photomontage Mastersheets.mxd, REVISED: 10/29/2019 , SCALE: 1:240,000 when printed at 11x17 Created By: Kelly Lyons Date: 10/29/2019 Project: 0483340

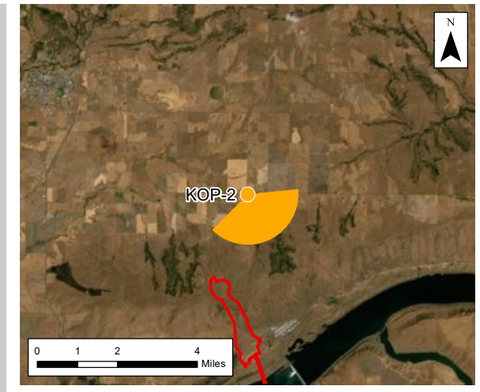
NAD 1983 StatePlane Washington South FIPS 4602 Feet

Existing View

Wireframe



Visual Simulation



Legend

- Key Observation Point (KOP) and View Angle

KOP-2
Intersection of Willis Road and Hoctor Road facing south

Latitude: 45.780501
Longitude: -120.719242
State Plane Northing: 163,143.61 ft
State Plane Easting: 1,584,480.68 ft
Elevation: 1908.35 ft
Orientation: S
Date: 5/15/2019
Vertical Field of View: 34°
Horizontal Field of View: 141°

Figure A-2
KOP 2: Master Sheet
Draft License Application
Goldendale Energy Storage Project
Goldendale, WA

Environmental Resources Management
www.erm.com
ERM

Created By: Kelly Lyons Date: 10/29/2019 Project: 0483340

FILE: M:\Projects\Goldendale Energy Storage Project\maps\DLA 2019\Exhibit E Section 8 Photomontage Mastersheets.mxd, REVISED: 10/29/2019 , SCALE: 1:240,000 when printed at 11x17

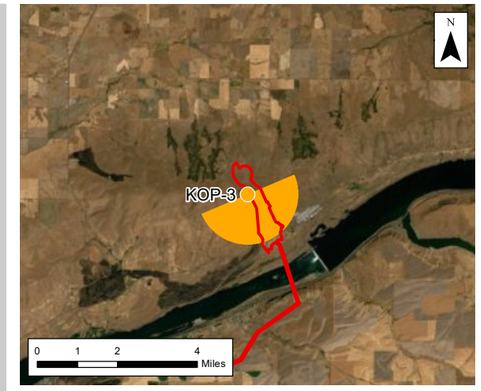
NAD 1983 StatePlane Washington South FIPS 4602 Feet

FILE: M:\Projects\Goldendale Energy Storage Project\maps\DLA 2019\Exhibit E Section 8 Photomontage Mastersheets.mxd, REVISED: 10/29/2019 , SCALE: 1:240,000 when printed at 11x17 Created By: Kelly Lyons Date: 10/29/2019 Project: 0483340

Existing View

Wireframe

Visual Simulation



Legend

- Key Observation Point (KOP) and View Angle

KOP-3
At the top of the Columbia Hills at Juniper Point looking south

Latitude: 45.739198
Longitude: -120.730625
State Plane Northing: 148,090.41 ft
State Plane Easting: 1,581,532.27 ft
Elevation: 3019.48 ft
Orientation: SSE
Date: 5/15/2019
Vertical Field of View: 35°
Horizontal Field of View: 180°

Figure A-3
KOP 3: Master Sheet
Draft License Application
Goldendale Energy Storage Project
Goldendale, WA

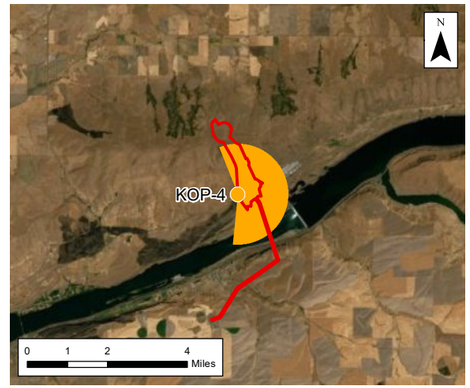
Environmental Resources Management
www.erm.com
ERM

NAD 1983 StatePlane Washington South FIPS 4602 Feet

Existing View

Wireframe

Visual Simulation



Legend

- Key Observation Point (KOP) and View Angle

KOP-4
On gravel pullout adjacent to the southeast side of Highway 14

Latitude: 45.723565
Longitude: -120.724968
State Plane Northing: 142,385.52 ft
State Plane Easting: 1,582,960.48 ft
Elevation: 950.13 ft
Orientation: ENE
Date: 5/15/2019
Vertical Field of View: 50°
Horizontal Field of View: 208°

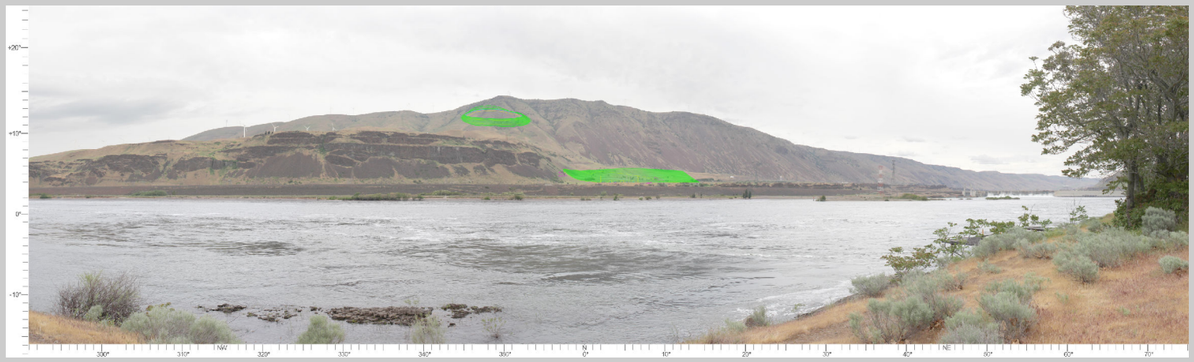
Figure A-4
KOP 4: Master Sheet
Draft License Application
Goldendale Energy Storage Project
Goldendale, WA

Environmental Resources Management
www.erm.com

FILE: M:\Projects\Goldendale Energy Storage Project\maps\DLA 2019\Exhibit E Section 8 Photomontage Mastersheets.mxd, REVISED: 10/29/2019 , SCALE: 1:240,000 when printed at 11x17 Created By: Kelly Lyons Date: 10/29/2019 Project: 0483340

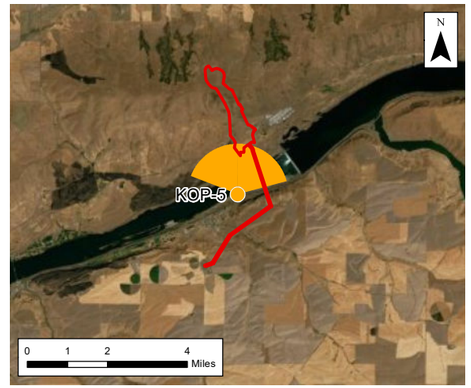
NAD 1983 StatePlane Washington South FIPS 4602 Feet

Existing View



Wireframe

Visual Simulation



Legend

- Key Observation Point (KOP) and View Angle

KOP-5
Near the town of Rufus along the bank of the Columbia River in Giles French/John Day Dam Park

Latitude: 45.704053
Longitude: -120.721325
State Plane Northing: 135,267.64 ft
State Plane Easting: 1,583,870.98 ft
Elevation: 176.56 ft
Orientation: N
Date: 5/15/2019
Vertical Field of View: 40°
Horizontal Field of View: 144°

Figure A-5
KOP 5: Master Sheet
Draft License Application
Goldendale Energy Storage Project
Goldendale, WA

Environmental Resources Management
www.erm.com

NAD 1983 StatePlane Washington South FIPS 4602 Feet