

# **GOLDENDALE ENERGY STORAGE HYDROELECTRIC PROJECT**

**Federal Energy Regulatory Commission Project No. 14861**

**Klickitat County, Washington**

## **FINAL LICENSE APPLICATION Exhibit E: Environmental Report**

**For:**

FFP Project 101, LLC



**June 2020**

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## **Acronyms and Abbreviations**

°F	degrees Fahrenheit
AF	acre-foot
AFY	acre-foot per year
AGO	Attorney General's Office
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
CTUIR	Confederated Tribes of the Umatilla Indian Reservation
CWA	Clean Water Act
DAHP	Washington State Department of Archaeology and Historic Preservation
dB	decibel
dBA	A-weighted decibel
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
FHWA	Federal Highway Administration
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
Licensee	FFP Project 101, LLC
MDL	minimum detection limit
mg/L	microgram per liter
MOU	Memorandum of Understanding
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
PLP	Potentially Liable Party
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
RI	Remedial Investigation
RPH	rare plant habitat
SCORP	Statewide Comprehensive Outdoor Recreation Plan
SHPO	State Historic Preservation Office
SPECP	Spill Prevention and Emergency Cleanup Plan
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
VMS	variable message signs
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
WQMP	Water Quality Monitoring Plan
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 11.0.

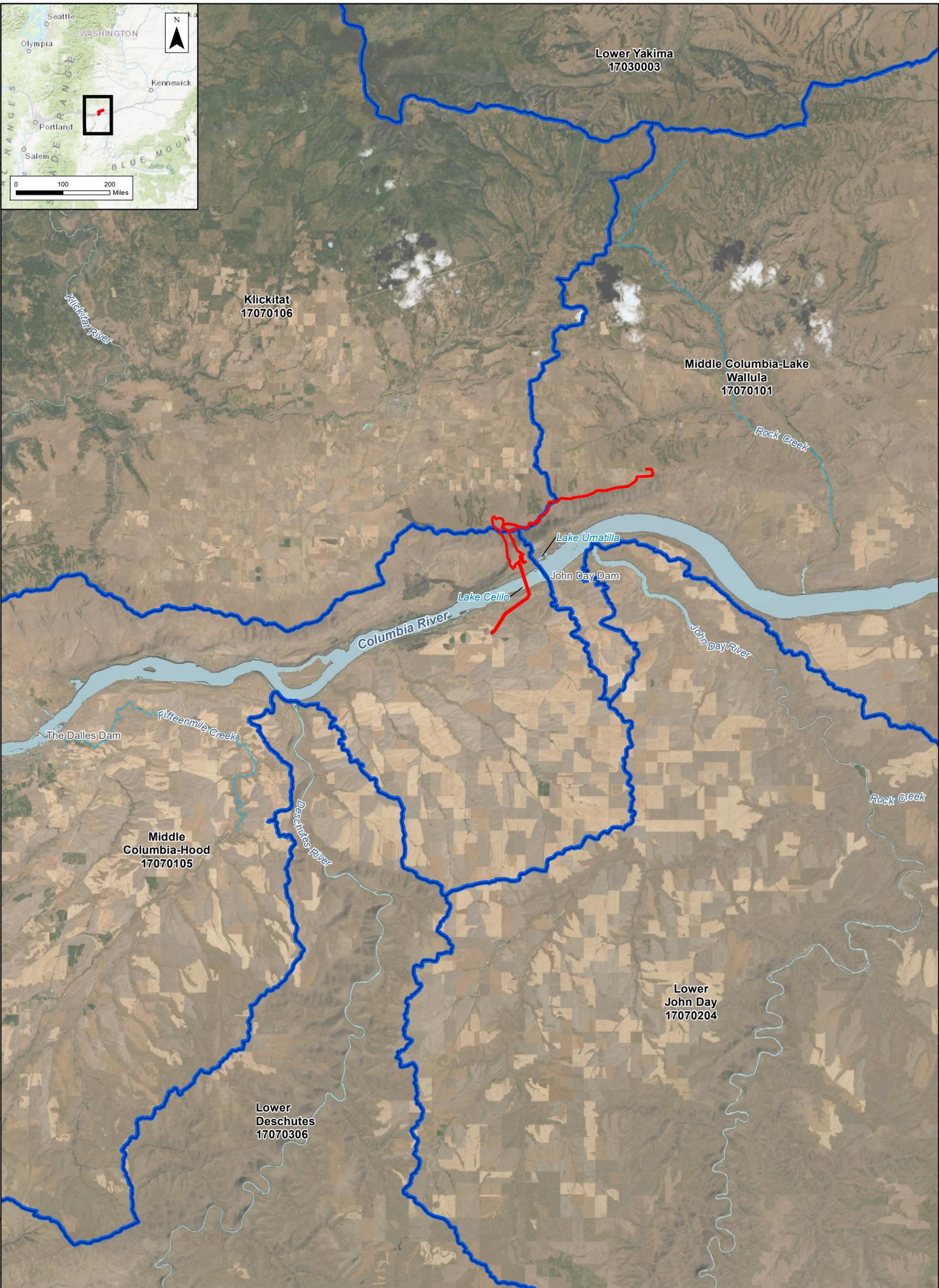
### **1.2 Major Land Uses**

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).

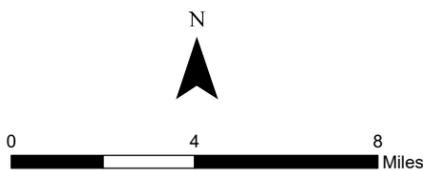
The upper reservoir vicinity includes wind farms and dry-land agriculture/rangeland. A wind farm is located just east of and adjacent to the Project Boundary and consists of 13 wind turbines owned by Tuolumne Wind Project Authority. These wind turbines are part of the Windy Point Phase I Project, which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



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

### **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.

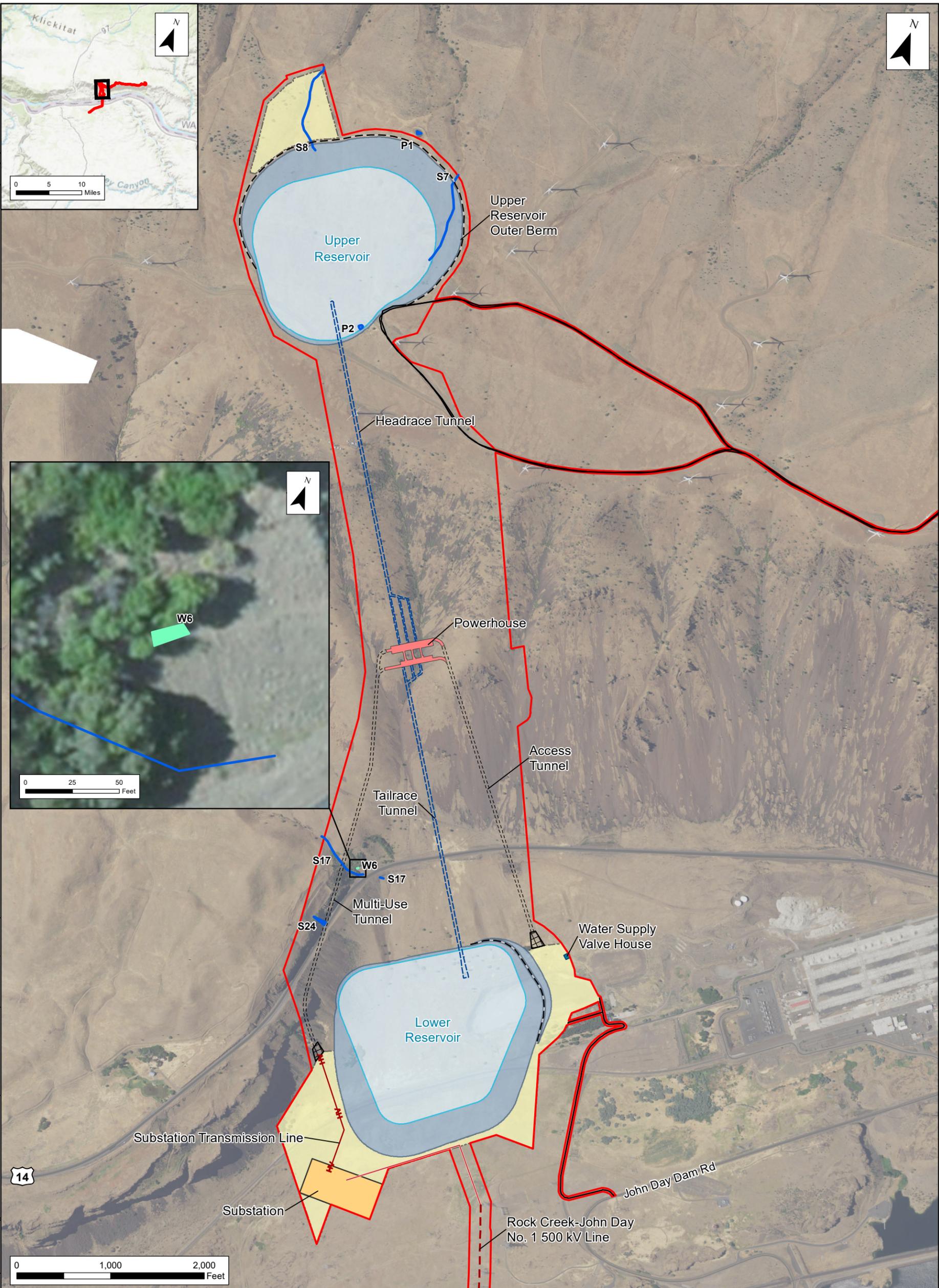
### **2.1 Existing Environment**

#### **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.

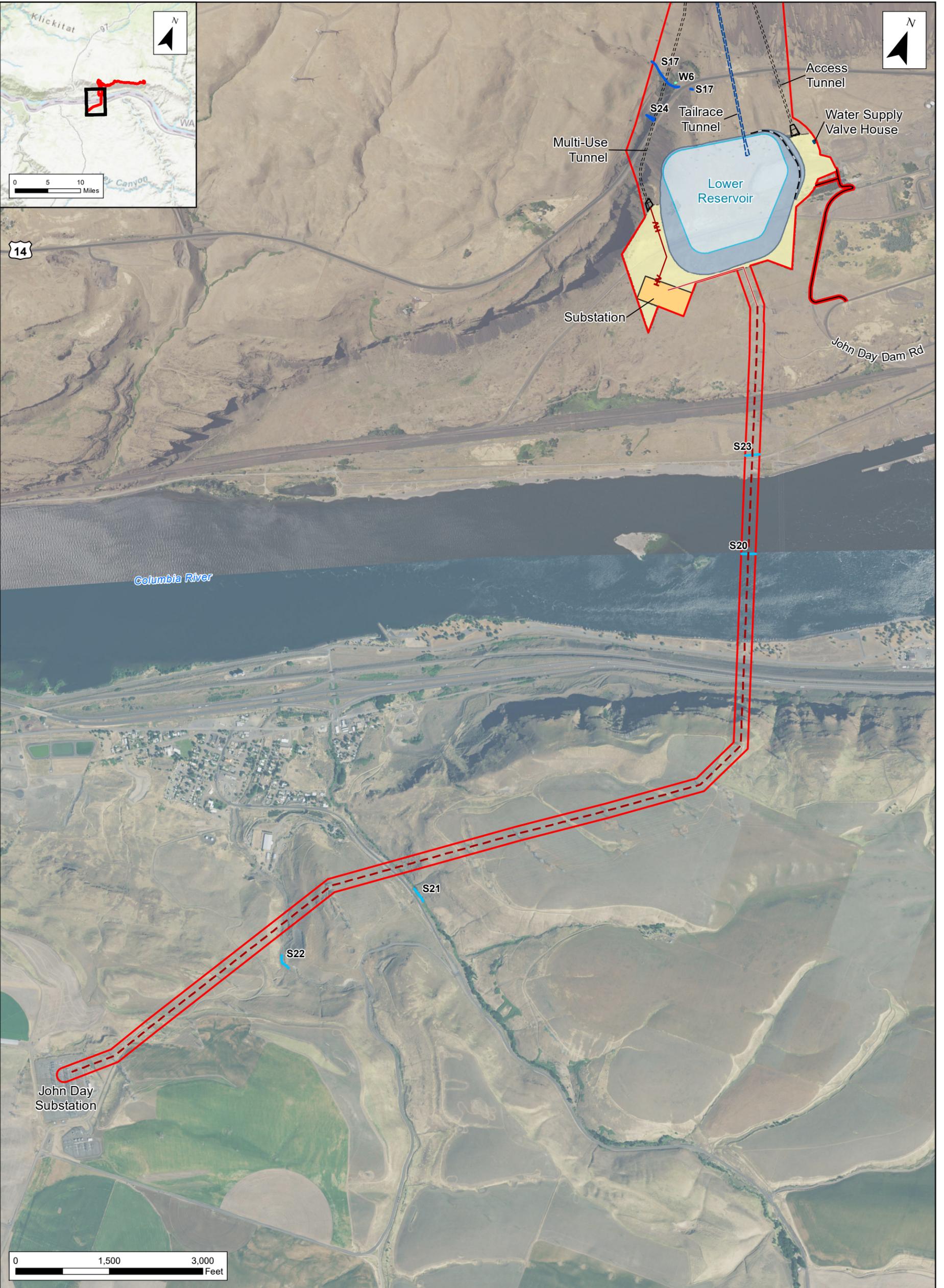
The Columbia River is the nearest surface water feature to the Project's reservoirs and power production infrastructure. It is located approximately 0.7 mile south of the Project's lower reservoir (Figure 2.1-1B). The U.S. Geological Survey (USGS) National Hydrography Dataset (NHD; USGS 2019) identifies 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	
<b>Waterbody Status</b>	— Transmission Line
— Field Verified Waterbody	— Transmission Co-Located with Existing BPA ROW
— Wetland	— Existing Access Road
— Project Boundary	— Reservoir
— Proposed Infrastructure	— Reservoir Berm Outer Slope
— Access Road	— Laydown Area
— High Voltage Cable	— Powerhouse
	— Substation
	— Water Supply Valve House
	— Access Tunnel
	— Access Tunnel Portal
	— Headrace/Tailrace Tunnel

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

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



**Legend**

- |                                |   |                          |
|--------------------------------|---|--------------------------|
| <b>Waterbody Status</b>        | High Voltage Cable                            | Laydown Area             |
| Field Verified Watercourse     | Transmission Line                             | Substation               |
| Desktop Verified Watercourse   | Transmission Co-Located with Existing BPA ROW | Water Supply Valve House |
| Wetland                        | Existing Access Road                          | Access Tunnel            |
| Project Boundary               | Reservoir                                     | Access Tunnel Portal     |
| <b>Proposed Infrastructure</b> | Reservoir Berm Outer Slope                    | Headrace/Tailrace Tunnel |
| Access Road                    |   |                          |

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

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<sup>a</sup>**

Water Metric	Columbia River			
	Minimum <sup>b</sup>	Maximum <sup>c</sup>	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

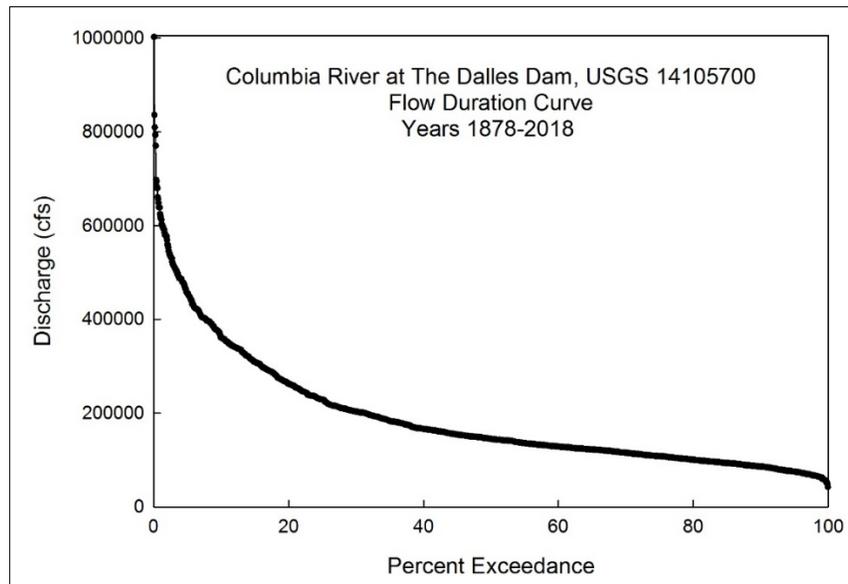
Sources: USGS 2019

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

<sup>a</sup> Based on 140 years of record 1878-2018

<sup>b</sup> 1937

<sup>c</sup> 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. Seasonal 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 Final License Application [FLA]). 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. FFP Project 101, LLC's (the Applicant and eventual Licensee) 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 (see Table 2.2-1 and Table 2.2-2). The withdrawal of surface water for the initial filling of the reservoir from KPUD's Intake Pool, which is a surface water source hydrologically connected to the Columbia River, is 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. Reservoir recharge resulting from evaporation losses will be conducted as necessary.

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) <sup>a</sup>	190	200
Estimated Precipitation (AFY) <sup>a</sup>	70	80
Placeholder for Losses (AFY) <sup>b</sup>	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

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

<sup>b</sup> 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 <sup>a</sup>
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 <sup>1</sup>	81,084,418	NA

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

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

Source: GeoPro LLC 2017

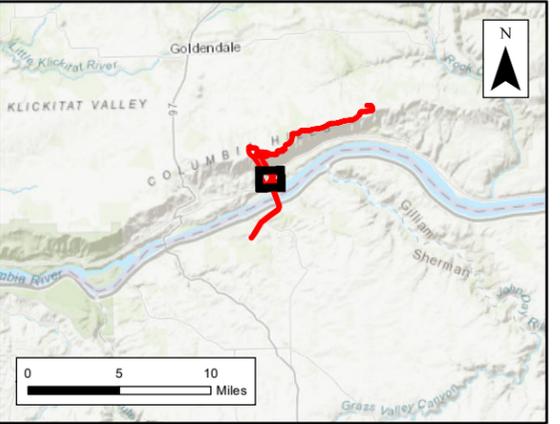
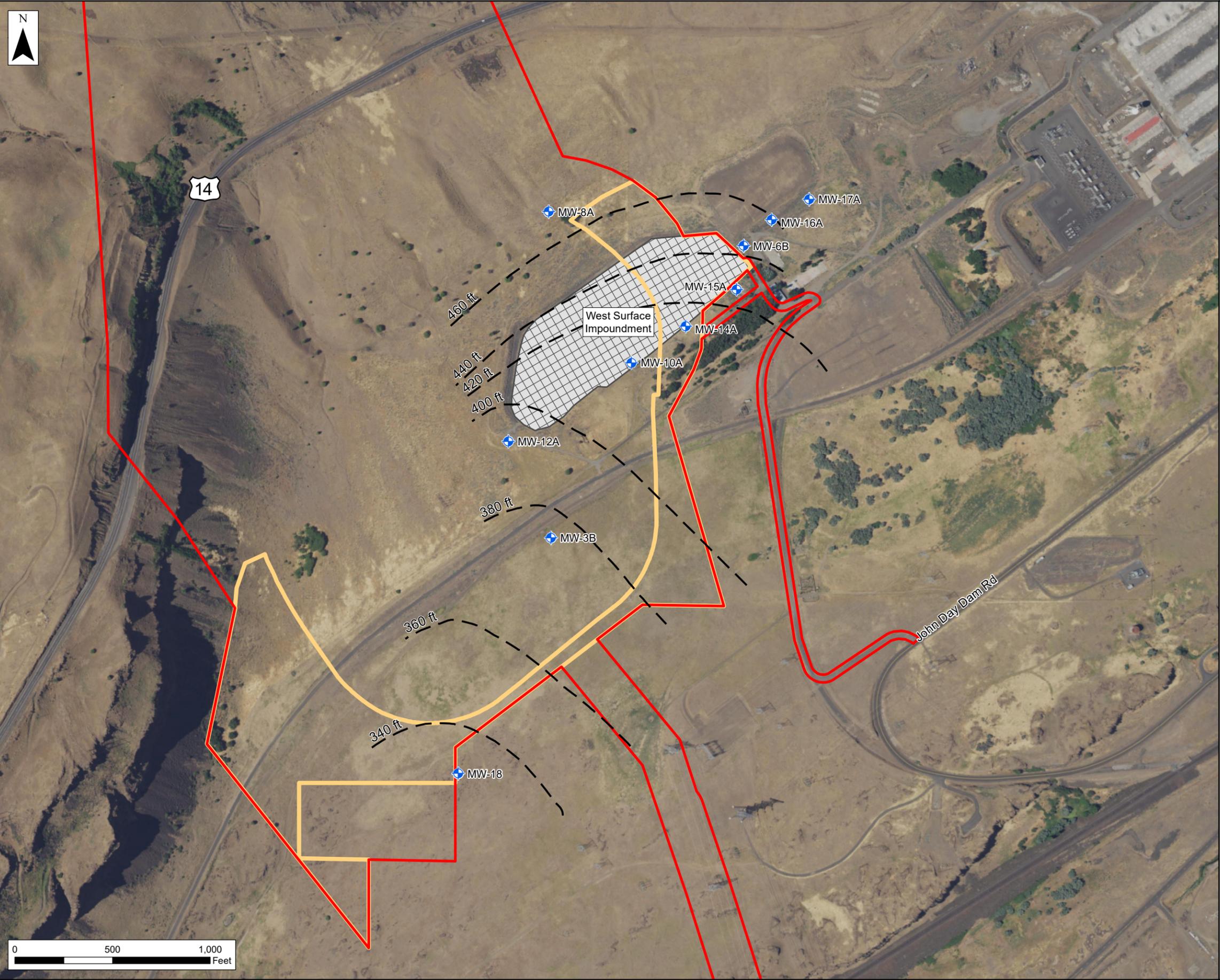
mg/L = microgram per liter

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 protection standards are being met.

<sup>a</sup> No UCL calculated. Well was dry during most sampling events. Value represents single measurement collected on March 13, 2007.

<sup>b</sup> No UCL calculated; all data was non-detect.

**Bold** indicates UCL exceeds lowest groundwater protection standard.



**Legend**

- ◆ GeoPro LLC Monitoring Well
- - - GeoPro LLC Estimated Groundwater Contours
- West Surface Impoundment (WSI)
- Temporary Laydown Area
- Project Boundary

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

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

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 Erosion and Sediment control plan will include BMPs such as:

- Minimize ground surface disturbance;
- Protect areas of exposed soil;
- Install silt fencing, coir logs, etc. around disturbed areas and soil stockpiles; and
- Revegetate as soon as possible after ground disturbance.

A Reservoir Water Quality Monitoring Plan (WQMP) will be developed in consultation with Ecology. The purpose of the WQMP will be to ensure that dissolved solids, nutrients, and heavy metals in the Project reservoirs do not rise to concentrations that could adversely affect aquatic life and wildlife. The Project is a closed-loop system and will not be open to the public; therefore, the primary purpose of the WQMP is for the protection of aquatic receptors. The WQMP will describe monitoring procedures for water quality parameters in the vicinity of the Project to provide the Licensee a means for identifying if and when water quality conditions warrant additional protective measures. The Licensee will monitor water quality parameters at the initial filling and periodically (annually).

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 luteiventris*), 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, Decapoda, 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 luteiventris*), 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 salmon/steelhead, 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 to 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. 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 (*Clethrionomys 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 cryptogammic 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
<b>Mammals</b>		
Badger	<i>Taxidea taxus</i>	1995 <sup>a</sup>
Bobcat	<i>Lynx rufus</i>	1995 <sup>a</sup>
Columbian black-tailed deer	<i>Odocoileus hemionus columbianus</i>	1995 <sup>a</sup> , 2002 <sup>b</sup> , 2005 <sup>a</sup> , 2019 <sup>c</sup>
Columbian ground squirrel	<i>Urocitullus columbiana</i>	1995 <sup>a</sup> , 2005 <sup>a</sup>
Coyote	<i>Canis latrans</i>	1995 <sup>a</sup> , 2005 <sup>a</sup> , 2019 <sup>c</sup>
Deer mouse	<i>Peromyscus maniculatus</i>	1995 <sup>a</sup>
Great Basin pocket mouse	<i>Perognathus parvus</i>	1995 <sup>a</sup>
Northern pocket gopher	<i>Thomomys talpoides</i>	1995 <sup>a</sup>
Nuttall's cottontail	<i>Sylvilagus nuttallii</i>	1995 <sup>a</sup>
Porcupine	<i>Erethizon dorsatum</i>	1995 <sup>a</sup> , 2019 <sup>c</sup>
Raccoon	<i>Procyon lotor</i>	1995 <sup>a</sup>

Common Name	Scientific Name	Year Observed
Red fox	<i>Vulpes fulva</i>	1995 <sup>a</sup>
Shrew	<i>Sorex spp.</i>	1995 <sup>a</sup>
Striped skunk	<i>Mephitis</i>	1995 <sup>a</sup>
Voles	<i>Microtis</i>	1995 <sup>a</sup> , 2005 <sup>a</sup>
Weasel	<i>Mustela spp.</i>	1995 <sup>a</sup>
Yellow-bellied marmot	<i>Marmota flaviventris</i>	1995 <sup>a</sup> , 2019 <sup>c</sup>
<b>Reptiles</b>		
Gopher snake	<i>Pituophis melanoleucus</i>	1995 <sup>a</sup> , 2005 <sup>a</sup>
Racer snake	<i>Coluber constrictor</i>	1995 <sup>a</sup>
Rubber boa	<i>Charina bottae</i>	2005 <sup>a</sup> , 2019 <sup>c</sup>
Short-horned lizard	<i>Phrynosoma douglassi</i>	1995 <sup>a</sup> , 2005 <sup>a</sup>
Southern alligator lizard	<i>Elgaria multicarinata</i>	2019 <sup>c</sup>
Western fence lizard	<i>Sceloporus occidentalis</i>	1995 <sup>a</sup> , 2005 <sup>a</sup>
Western garter snake	<i>Thamnophis elegans</i>	1995 <sup>a</sup> , 2005 <sup>a</sup>
Western rattlesnake	<i>Crotalus viridis</i>	1995 <sup>a</sup> , 2005 <sup>a</sup>

Sources:

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

<sup>b</sup> WEST 2006—Appendix A1; Windy Point Project Site species (February 14 and April 11, 2002)

<sup>c</sup> 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

Native birds in the United States are protected by the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. 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	<i>Corvus brachyrhynchos</i>	2002 <sup>a</sup> , 2002 <sup>b</sup> , 2005 <sup>c</sup>
American goldfinch	<i>Carduelis tristis</i>	1998 <sup>e</sup> , 2002 <sup>b</sup>
American kestrel	<i>Falco sparverius</i>	1998 <sup>e</sup> , 2002 <sup>a</sup> , 2002 <sup>b</sup> , 2005 <sup>c</sup> , 2008 <sup>d</sup>
American pipit	<i>Anthus spinoletta</i>	1998 <sup>e</sup>
American robin	<i>Turdus migratorius</i>	1998 <sup>e</sup> , 2002 <sup>a</sup> , 2002 <sup>b</sup> , 2005 <sup>c</sup> , 2008 <sup>d</sup>
American wigeon	<i>Anas americana</i>	2002 <sup>a</sup>
Ash-throated flycatcher	<i>Myiarchus cinerascens</i>	1998 <sup>e</sup> , 2002 <sup>b</sup>
Bald eagle	<i>Haliaeetus leucocephalus</i>	1998 <sup>e</sup> , 2002 <sup>a</sup> , 2008 <sup>d</sup>
Barn swallow	<i>Hirundo rustica</i>	1998 <sup>e</sup> , 2002 <sup>b</sup> , 2005 <sup>c</sup>
Bewick's wren	<i>Thryomanes bewickii</i>	2002 <sup>a</sup> , 2002 <sup>b</sup>
Black-billed magpie	<i>Pica pica</i>	1998 <sup>e</sup> , 2002 <sup>a</sup> , 2002 <sup>b</sup> , 2005 <sup>c</sup> , 2008 <sup>d</sup>
Brewer's blackbird	<i>Euphagus cyanocephalus</i>	2002 <sup>b</sup>
Brewer's sparrow	<i>Spizella breweri</i>	2002 <sup>b</sup>
Bohemian waxwing	<i>Bombycilla garrulus</i>	1998 <sup>e</sup>
Brown-headed cowbird	<i>Molothrus ater</i>	1998 <sup>e</sup> , 2002 <sup>b</sup>
Bullock's oriole	<i>Icterus bullockii</i>	1998 <sup>e</sup> , 2002 <sup>b</sup>
California gull	<i>Larus californicus</i>	2002 <sup>b</sup>
California quail	<i>Callipepla californica</i>	2002 <sup>a</sup> , 2002 <sup>b</sup> , 2005 <sup>c</sup>
Canada goose	<i>Branta canadensis</i>	1998 <sup>e</sup> , 2002 <sup>a</sup> , 2002 <sup>b</sup> , 2008 <sup>d</sup>
Canyon wren	<i>Catherpes mexicanus</i>	1998 <sup>e</sup> , 2002 <sup>a</sup>
Cassin's finch	<i>Carpodacus cassinii</i>	1998 <sup>e</sup>
Chipping sparrow	<i>Spizella passerina</i>	1998 <sup>e</sup> , 2002 <sup>a</sup> , 2002 <sup>b</sup>
Chukar	<i>Alectoris chukar</i>	1998 <sup>e</sup> , 2002 <sup>a</sup> , 2008 <sup>d</sup>
Clark's nutcracker	<i>Nucifraga columbiana</i>	1998 <sup>e</sup>
Cliff swallow	<i>Petrochelidon pyrrhonota</i>	1998 <sup>e</sup> , 2002 <sup>b</sup>
Common raven	<i>Corvus corax</i>	1998 <sup>e</sup> , 2002 <sup>a</sup> , 2002 <sup>b</sup> , 2008 <sup>d</sup>

Common Name	Scientific Name	Year Observed
Common nighthawk	<i>Chordeiles minor</i>	2005 <sup>c</sup>
Cooper's hawk	<i>Accipiter cooperi</i>	1998 <sup>e</sup>
Dark-eyed junco	<i>Junco hyemalis</i>	1998 <sup>e</sup> , 2002 <sup>a</sup> , 2002 <sup>b</sup> , 2008 <sup>d</sup>
Downy woodpecker	<i>Picoides pubescens</i>	2002 <sup>a</sup>
European starling	<i>Sturnus vulgaris</i>	1998 <sup>e</sup> , 2002 <sup>a</sup> , 2002 <sup>b</sup> , 2008 <sup>d</sup>
Ferruginous hawk	<i>Buteo regalis</i>	2002 <sup>b</sup>
Forster's tern	<i>Sterna forsteri</i>	2002 <sup>b</sup>
Golden eagle	<i>Aquila chrysaetos</i>	1998 <sup>e</sup> , 2002 <sup>a</sup> , 2002 <sup>b</sup> , 2008 <sup>d</sup>
Golden-crowned kinglet	<i>Regulus satrapa</i>	1998 <sup>e</sup> , 2002 <sup>a</sup> , 2002 <sup>b</sup>
Golden-crowned sparrow	<i>Zonotrichia atricapilla</i>	2002 <sup>a</sup> , 2002 <sup>b</sup>
Grasshopper sparrow	<i>Ammodramus savannarum</i>	1998 <sup>e</sup>
Gray flycatcher	<i>Empidonax wrightii</i>	1998 <sup>e</sup>
Gray partridge	<i>Perdix perdix</i>	1998 <sup>e</sup> , 2002 <sup>a</sup> , 2002 <sup>b</sup> , 2008 <sup>d</sup>
Gray-crowned rosy finch	<i>Leucosticte tephrocotis</i>	1998 <sup>e</sup>
Gull (unidentified species)	<i>Larus sp.</i>	1998 <sup>e</sup> , 2002 <sup>b</sup>
Hairy woodpecker	<i>Picoides villosus</i>	2002 <sup>a</sup>
Hermit thrush	<i>Catharus guttatus</i>	1998 <sup>e</sup>
Horned lark	<i>Eremophila alpestris</i>	1998 <sup>e</sup> , 2002 <sup>a</sup> , 2002 <sup>b</sup> , 2005 <sup>c</sup> , 2008 <sup>d</sup>
House finch	<i>Carpodacus mexicanus</i>	2002 <sup>b</sup>
Killdeer	<i>Charadrius vociferus</i>	1998 <sup>e</sup> , 2002 <sup>a</sup> , 2002 <sup>b</sup> , 2005 <sup>c</sup>
Lark sparrow	<i>Chondestes grammacus</i>	1998 <sup>e</sup> , 2002 <sup>b</sup>
Lazuli bunting	<i>Passerina amoena</i>	1998 <sup>e</sup> , 2002 <sup>b</sup>
Lesser goldfinch	<i>Carduelis psaltria</i>	2002 <sup>b</sup>
Lewis's woodpecker	<i>Melanerpes lewis</i>	1998 <sup>e</sup> , 2002 <sup>b</sup> , 2005 <sup>c</sup>
Loggerhead shrike	<i>Lanius ludovicianus</i>	1998 <sup>e</sup>
Long-billed curlew	<i>Numenius americanus</i>	2005 <sup>c</sup>
Mallard	<i>Anas platyrhynchos</i>	2002 <sup>a</sup>
Merlin	<i>Falco columbarius</i>	1998 <sup>e</sup> , 2002 <sup>b</sup>
Mountain bluebird	<i>Sialia currucoides</i>	1998 <sup>e</sup> , 2002 <sup>a</sup> , 2008 <sup>d</sup>
Mourning dove	<i>Zenaida macroura</i>	2002 <sup>b</sup> , 2005 <sup>c</sup>
Nighthawk	<i>Chordeiles minor</i>	1998 <sup>e</sup>
Northern flicker	<i>Colaptes auratus</i>	1998 <sup>e</sup> , 2002 <sup>b</sup> , 2008 <sup>d</sup>
Northern harrier	<i>Circus cyaneus</i>	1998 <sup>e</sup> , 2002 <sup>a</sup> , 2002 <sup>b</sup> , 2005 <sup>c</sup> , 2008 <sup>d</sup>
Northern rough-winged swallows	<i>Stelgidopteryx serripennis</i>	2002 <sup>b</sup>
Northern shrike	<i>Lanius excubitor</i>	1998 <sup>e</sup> , 2002 <sup>a</sup> , 2008 <sup>d</sup>
Osprey	<i>Pandion haliaetus</i>	1998 <sup>e</sup> , 2002 <sup>b</sup>
Prairie falcon	<i>Falco mexicanus</i>	1998 <sup>e</sup> , 2002 <sup>a</sup> , 2002 <sup>b</sup> , 2008 <sup>d</sup>

Common Name	Scientific Name	Year Observed
Red-breasted nuthatch	<i>Sitta canadensis</i>	1998 <sup>e</sup>
Red crossbill	<i>Loxia curvirosta</i>	1998 <sup>e</sup>
Red-tailed hawk	<i>Buteo jamaicensis</i>	1998 <sup>e</sup> , 2002 <sup>a</sup> , 2002 <sup>b</sup> , 2005 <sup>c</sup> , 2008 <sup>d</sup>
Red-winged blackbird	<i>Agelaius phoeniceus</i>	2002 <sup>a</sup> , 2002 <sup>b</sup>
Ring-billed gull	<i>Larus delawarensis</i>	2002 <sup>b</sup>
Ring-necked pheasant	<i>Phasianus colchicus</i>	1998 <sup>e</sup> , 2002 <sup>a</sup> , 2002 <sup>b</sup> , 2005 <sup>c</sup>
Rock wren	<i>Salpinctes obsoletus</i>	1998 <sup>e</sup> , 2002 <sup>b</sup>
Rough-legged hawk	<i>Buteo lagopus</i>	1998 <sup>e</sup> , 2002 <sup>a</sup> , 2008 <sup>d</sup>
Rufous hummingbird	<i>Selasphorus rufus</i>	1998 <sup>e</sup>
Savannah sparrow	<i>Passerculus sandwichensis</i>	1998 <sup>e</sup>
Say's phoebe	<i>Sayornis saya</i>	1998 <sup>e</sup> , 2002 <sup>a</sup> , 2002 <sup>b</sup>
Sharp-shinned hawk	<i>Accipiter striatus</i>	1998 <sup>e</sup> , 2002 <sup>a</sup> , 2008 <sup>d</sup>
Song sparrow	<i>Melospiza melodia</i>	2002 <sup>b</sup>
Spotted sandpiper	<i>Actitis macularia</i>	2002 <sup>b</sup>
Spotted towhee	<i>Pipilo maculatus</i>	1998 <sup>e</sup> , 2002 <sup>b</sup>
Swainson's hawk	<i>Buteo swainsoni</i>	2002 <sup>b</sup> , 2005 <sup>c</sup>
Townsend's solitaire	<i>Myadestes townsendi</i>	1998 <sup>e</sup> , 2002 <sup>a</sup> , 2008 <sup>d</sup>
Townsend's warbler	<i>Dendroica townsendi</i>	1998 <sup>e</sup>
Tree swallow	<i>Tachycineta bicolor</i>	1998 <sup>e</sup> , 2008 <sup>d</sup>
Turkey vulture	<i>Cathartes aura</i>	1998 <sup>e</sup> , 2002 <sup>b</sup> , 2005 <sup>c</sup>
Varied thrush	<i>Ixoreus naevius</i>	1998 <sup>e</sup>
Vesper sparrow	<i>Pooecetes gramineus</i>	1998 <sup>e</sup> , 2002 <sup>b</sup> , 2008 <sup>d</sup>
Violet-green swallow	<i>Tachycineta thalassina</i>	2002 <sup>a</sup> , 2002 <sup>b</sup>
Western bluebird	<i>Sialia mexicana</i>	1998 <sup>e</sup> , 2008 <sup>d</sup>
Western kingbird	<i>Tyrannus verticalis</i>	2002 <sup>b</sup> , 2005 <sup>c</sup>
Western meadowlark	<i>Sturnella neglecta</i>	1998 <sup>e</sup> , 2002 <sup>a</sup> , 2002 <sup>b</sup> , 2005 <sup>c</sup> , 2008 <sup>d</sup>
Western wood-pewee	<i>Contopus virens</i>	1998 <sup>e</sup> , 2002 <sup>b</sup>
Western tanager	<i>Piranga ludoviciana</i>	1998 <sup>e</sup>
White-breasted nuthatch	<i>Sitta carolinensis</i>	1998 <sup>e</sup>
White-crowned sparrow	<i>Zonotrichia leucophrys</i>	1998 <sup>e</sup> , 2002 <sup>a</sup> , 2002 <sup>b</sup>
White-winged crossbill	<i>Loxia leucoptera</i>	1998 <sup>e</sup>
Wilson's warbler	<i>Wilsonia pusilla</i>	2002 <sup>b</sup>
Yellow-rumped warbler	<i>Dendroica coronata</i>	1998 <sup>e</sup> , 2002 <sup>b</sup>

## Sources:

<sup>a</sup> WEST 2006—Appendix A1; Windy Point Project Site species (February 14 and April 11, 2002)

<sup>b</sup> WEST 2006—Appendix A2; Klickitat County PEIS species (April 15 and July 12, 2002)

<sup>c</sup> Ecology and Environment 2006 — Windy Point Project Site species (May 3–7, July 15–17, and August 23, 2005)

<sup>d</sup> WEST 2008—Windy Point II Wind Resource Area species (February 1 through March 26, 2008)

<sup>e</sup> 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). In addition to those three historic golden eagle nest locations, there are four historic nest locations to the east of Project Boundary and just below the access road. 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).

## **Prairie Falcon**

Prairie falcons are known to occur within the Project Boundary and in the Project vicinity within the John Day Dam territory, with up to two historic prairie falcon nest locations documented by WDFW southeast and northeast of the Project Boundary (Figure 3.2-2, filed as privileged information). In 2019, WDFW surveys documented two adult prairie falcons displaying courtship behavior and confirmed an occupied nest (Nest #288; WDFW 2019d). Prairie falcons are also migratory birds and subject to the terms of the Migratory Bird Treaty Act.

**Figure 3.2-2: Prairie Falcon Nests, Filed as Privileged Information**

### 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.

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
<b>Birds</b>							
Ferruginous hawk	<i>Buteo regalis</i>	--	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	<i>Otus flammeolus</i>	--	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	<i>Aquila chrysaetos</i>	--	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	<i>Lanius ludovicianus</i>	--	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	<i>Dryocopus pileatus</i>	--	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	<i>Oreoscoptes montanus</i>	--	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	<i>Artemisiospiza nevadensis</i>	--	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	<i>Athene cunicularia hypugaea</i>	--	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	<i>Picoides albolarvatus</i>	--	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 Cascade Mountains (Larsen et al. 2004)
<b>Mammals</b>							
Black-tailed jackrabbit	<i>Lepus californicus</i>	--	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	<i>Canis lupus</i>	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	<i>Corynorhinus townsendii</i>	--	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	<i>Corynorhinus townsendii pallescens</i>	--	C	--	Unknown—little data available	--	Unknown
Townsend's ground squirrel	<i>Spermophilus townsendii</i>	--	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	<i>Sciurus griseus</i>	--	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	<i>Lepus townsendii</i>	--	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)
<b>Invertebrates</b>							
Columbia Oregonian (snail)	<i>Cryptomastix hendersoni</i>	--	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	<i>Mitoura grynea barryi</i>	--	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	<i>Polites mardon</i>		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)
<b>Reptiles</b>							
California mountain kingsnake	<i>Lampropeltis zonata</i>	--	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	<i>Sceloporus graciosus</i>		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	<i>Masticophis taeniatus</i>	--	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	<i>Anaxyrus boreas</i>	--	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 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; Wiltseco et al. 1993; Kempnaers 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 comment letter on the Pre-Application Document, 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 introduced 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 versus 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 below 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 FLA), 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 7 a.m. and 6 p.m.) to minimize impacts to crepuscular foraging and nocturnal activity.
- Wildlife studies
  - Raptors—pre-construction raptor nest surveys, monitoring of golden eagle and prairie falcon use, and bald eagle monitoring. Surveys will focus on known historic nest locations, including the historic golden eagle and prairie falcon 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.
- Mitigate for habitat loss by conserving a compensatory mitigation parcel approved by USFWS and WDFW. The parcel will be of similar quality as the golden eagle foraging habitat impacted by the Project's permanent features. A mitigation ratio of 2:1 acres will be used for habitat impacts of the upper reservoir; a ratio of 1:1 acres will be used for the lower reservoir/WSI area because of the poor quality, degraded state.

### 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 avoids 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 palliatives or suppressants would be applied to unpaved roads to reduce dust (see the WMP for more details, which is included as Appendix D).

### 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.
- Reservoirs will be fenced to a minimum height of 8 feet with chain link fence. Weather permitting, fences will be monitored on at least a weekly basis when staff are present at the reservoirs, and any damage (e.g., vandalism) will be fixed immediately as it is practicable. Any damage or occurrences of injury or mortality to wildlife species as a result of fencing will be documented and reported to WDFW. All fences associated with the Project will also be marked with vinyl strips and/or reflective tape to reduce avian collision risks.
- 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 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 armeniacus*) 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
<b>WA State Class A Weeds</b>	
broom, French	<i>Genista monspessulana</i>
broom, Spanish	<i>Spartium junceum</i>
common crupina	<i>Crupina vulgaris</i>
cordgrass, common	<i>Spartina anglica</i>
cordgrass, dense flower	<i>Spartina densiflora</i>
cordgrass, salt meadow	<i>Spartina patens</i>
cordgrass, smooth	<i>Spartina alterniflora</i>
dyers woad	<i>Isatis tinctoria</i>
eggleaf spurge *	<i>Euphorbia oblongata</i>
false brome	<i>Brachypodium sylvaticum</i>
floating primrose-willow	<i>Ludwigia peploides</i>
flowering rush	<i>Butomus umbellatus</i>
garlic mustard	<i>Alliaria petiolata</i>
giant hogweed *	<i>Heracleum mantegazzianum</i>
goatsrue	<i>Galega officinalis</i>
hydrilla	<i>Hydrilla verticillata</i>
johnsongrass *	<i>Sorghum halepense</i>
knapweed, bighead *	<i>Centaurea macrocephala</i>
knapweed, Vochin *	<i>Centaurea nigrescens</i>
kudzu	<i>Pueraria montana var. lobata</i>
meadow clary	<i>Salvia pratensis</i>
oriental clematis	<i>Clematis orientalis</i>
purple starthistle	<i>Centaurea calcitrapa</i>

<b>Common Name</b>	<b>Scientific Name</b>
reed sweetgrass	<i>Glyceria maxima</i>
ricefield bulrush	<i>Schoenoplectus mucronatus</i>
sage, clary	<i>Salvia sclarea</i>
sage, Mediterranean *	<i>Salvia aethiopsis</i>
silverleaf nightshade	<i>Solanum elaeagnifolium</i>
spurge flax	<i>Thymelaea passerina</i>
Syrian bean-caper	<i>Zygophyllum fabago</i>
Texas blueweed	<i>Helianthus ciliaris</i>
thistle, Italian	<i>Carduus pycnocephalus</i>
thistle, milk	<i>Silybum marianum</i>
thistle, slenderflower	<i>Carduus tenuiflorus</i>
variable-leaf milfoil	<i>Myriophyllum heterophyllum</i>
wild four o'clock	<i>Mirabilis nyctaginea</i>
<b>WA State Class B-Designate Weeds</b>	
blueweed	<i>Echium vulgare</i>
Brazilian elodea	<i>Egeria densa</i>
bugloss, annual	<i>Anchusa arvensis</i>
bugloss, common	<i>Anchusa officinalis</i>
camelthorn	<i>Alhagi mauroorum</i>
common fennel	<i>Foeniculum vulgare</i>
common reed, nonnative	<i>Phragmites australis</i>
fanwort	<i>Cabomba caroliniana</i>
gorse	<i>Ulex europaeus</i>
grass-leaved arrowhead	<i>Sagittaria graminea</i>
hawkweed oxtongue	<i>Picris hieracioides</i>
hawkweed, orange	<i>Hieracium aurantiacum</i>
herb-Robert *	<i>Geranium robertianum</i>
knapweed, black	<i>Centaurea nigra</i>
knapweed, brown	<i>Centaurea jacea</i>
knotweed, Bohemian *	<i>Polygonuym x bohemicum</i>
knotweed, giant *	<i>Polygonum sachalinense</i>
knotweed, Himalayan	<i>Polygonum polystachyum</i>
knotweed, Japanese *	<i>Polygonum cuspidatum</i>
loosestrife, garden	<i>Lysimachia vulgaris</i>
loosestrife, purple *	<i>Lythrum salicaria</i>
loosestrife, wand	<i>Lythrum virgatum</i>
Nonnative hawkweed species and hybrids of WALL subgenus	<i>Hieracium</i> subgenus, <i>Hieracium</i>
parrotfeather	<i>Myriophyllum aquaticum</i>
policeman's helmet	<i>Impatiens glandulifera</i>
saltcedar *(unless intentionally planted prior to 2004)	<i>Tamarix ramosissima</i>
shiny geranium	<i>Geranium lucidum</i>
spurge laurel	<i>Daphne laureola</i>

<b>Common Name</b>	<b>Scientific Name</b>
spurge, leafy *	<i>Euphorbia esula</i>
spurge, myrtle *	<i>Euphorbia myrsinites</i>
thistle, musk	<i>Carduus nutans</i>
thistle, plumeless	<i>Carduus acanthoides</i>
thistle, Scotch *	<i>Onopordum acanthium</i>
velvetleaf	<i>Abutilon theophrasti</i>
water primrose	<i>Ludwigia hexapetala</i>
white bryony	<i>Bryonia alba</i>
wild chervil	<i>Anthriscus sylvestris</i>
yellow archangel *	<i>Lamium galeobdolon</i>
yellow floating heart	<i>Nymphoides peltata</i>
<b>Klickitat County Class B-Weeds</b>	
butterfly bush *	<i>Buddleia davidii</i>
Dalmatian toadflax *	<i>Linaria dalmatica</i> ssp. <i>dalmatica</i>
Eurasian watermilfoil *	<i>Myriophyllum spicatum</i>
hairy willow-herb *	<i>Epilobium hirsutum</i>
hoary alyssum *	<i>Berteroa incana</i>
houndstongue *	<i>Cynoglossum officinale</i>
indigobush *	<i>Amorpha fruticosa</i>
knapweed, diffuse *	<i>Centaurea diffusa</i>
knapweed, meadow *	<i>Centaurea x moncktonii</i>
knapweed, Russian *	<i>Acroptilon repens</i>
knapweed, spotted *	<i>Centaurea stoebe</i>
kochia *	<i>Kochia scoparia</i>
lesser celandine	<i>Ficaria verna</i>
Nonnative hawkweed species and hybrids of MEADOW subgenus	<i>Hieracium</i> subgenus, <i>Pilosella</i>
perennial pepperweed *	<i>Lepidium latifolium</i>
poison hemlock *	<i>Conium maculatum</i>
puncturevine *	<i>Tribulus terrestris</i>
Ravenna grass	<i>Saccharum ravennae</i>
rush skeletonweed *	<i>Chondrilla juncea</i>
Scotch broom *	<i>Cytisus scoparius</i>
sulfur cinquefoil *	<i>Potentilla recta</i>
tansy ragwort *	<i>Senecio jacobaea</i>
yellow nutsedge*	<i>Cyperus esculentus</i>
yellow starthistle *	<i>Centaurea solstitialis</i>
<b>Klickitat County Class C Weeds</b>	
Austrian fieldcress *	<i>Rorippa austriaca</i>
black henbane	<i>Hyoscyamus niger</i>
buffalobur *	<i>Solanum rostratum</i>
hairy whitetop *	<i>Cardaria pubescens</i>
hoary cress *	<i>Cardaria draba</i>

Common Name	Scientific Name
Italian arum	<i>Arum italicum</i>
jubata grass	<i>Cortaderia jubata</i>
longspine sandbur *	<i>Cenchrus longispinus</i>
Nonnative cattails and hybrids (does not include native <i>Typha latifolia</i> )	<i>Typha</i> species
pampas grass	<i>Cordaderia selloana</i>
spikeweed *	<i>Hemizonia pungens</i>
spiny cocklebur *	<i>Xanthium spinosum</i>
Swainsonpea *	<i>Sphaerophysa salsula</i>
thistle, Canada *	<i>Cirsium arvense</i>
yellow flag iris *	<i>Iris pseudacorus</i>
yellow toadflax	<i>Linaria vulgaris</i>
<b>Klickitat County Weeds of Local Concern</b>	
common St. Johnswort *	<i>Hypericum perforatum</i>
jointed goatgrass *	<i>Aegilops cylindrica</i>
wild carrot *	<i>Daucus carota</i>

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
<b>"A" Class—High Priority</b>	
Canada thistle	<i>Cirsium arvense</i>
Houndstongue	<i>Cynoglossum officinale</i>
Jimsonweed	<i>Datura stramonium</i>
Kochia	<i>Kochia scoparia</i>
Leafy spurge	<i>Euphorbia esula</i>
Knapweed complex	<i>Centaurea</i> sp.
Rush skeletonweed	<i>Chondrilla juncea</i>
Spikeweed	<i>Hemizonia pungens</i>

<b>Common Name</b>	<b>Scientific Name</b>
Yellow starthistle	<i>Centaurea solstitialis</i>
<b>“B” Class – Moderate Priority</b>	
Canada thistle	<i>Cirsium arvense</i>
Dalmation toadflax	<i>Linaria dalmatica</i>
Field bindweed	<i>Convolvulus arvensis</i>
Knapweed complex	<i>Centaurea sp.</i>
Perennial sowthistle	<i>Sonchus arvensis</i>
Scotch thistle	<i>Onopordum acanthium</i>
Scouring rush	<i>Equisetum laevigatum</i>
Showy milkweed	<i>Asclepias speciosa</i>
Whitetop (hoary cress)	<i>Cardaria draba</i>
Wild oats	<i>Avena fatua</i>
Yellow starthistle	<i>Centaurea solstitialis</i>
<b>“C” Class – Low Priority</b>	
Bull Thistle	<i>Cirsium vulgare</i>
Common Rye	<i>Secale cereale</i>
Field Dodder	<i>Cuscuta campestris</i>
Jointed Goatgrass	<i>Aegilops cylindrical</i>
Klamath Weed (St. Johnswort)	<i>Hypericum perforatum</i>
Little Bur (Bur Buttercup)	<i>Ranunculus testiculatus</i>
Marestail	<i>Contza canadensis</i>
Medusahead Rye	<i>Taeniatherum caput-medusae</i>
Perennial pepperweed	<i>Lepidium latifolium</i>
Poison hemlock	<i>Conium maculatum</i>
Prickly lettuce	<i>Lactuca serriola</i>
Puncturevine	<i>Tribulus terrestris</i>
Quackgrass	<i>Elymus repens</i>
Russian thistle	<i>Salsola iberica</i>
Spiney cocklebur	<i>Xanthium spinosum</i>
Western water hemlock	<i>Cicuta douglasii</i>
Wavyleaf thistle	<i>Cirsium undulatum</i>
<b>“Q” Class – Questionable List</b>	
Hairy willow-herb	<i>Epilobium hirsutum</i>
<b>“T” Class – Targeted List</b>	
Canada thistle	<i>Cirsium arvense</i>
Dalmation toadflax	<i>Linaria dalmatica</i>
Jimsonweed	<i>Datura stramonium</i>
Knapweed complex	<i>Centaurea sp.</i>
Kochia	<i>Kochia scoparia</i>
Leafy spurge	<i>Euphorbia esula</i>
Rush skeletonweed	<i>Chondrilla juncea</i>
Scotch thistle	<i>Onopordum acanthium</i>

Common Name	Scientific Name
Spikeweed	<i>Hemizonia pungens</i>
Whitetop (hoary cress)	<i>Cardaria draba</i>
Yellow starthistle	<i>Centaurea solstitialis</i>
<b>“W” Class – Watch List</b>	
Blessed Milkthistle	<i>Silybum marianum</i>
Camelthorn	<i>Alhagi pseudalhagi</i>
Common Crupina	<i>Crupina vulgaris</i>
Gorse	<i>Ulex europaeus</i>
Halogeton	<i>Halogeton glomeratus</i>
Iberian Starthistle	<i>Centaurea iberica</i>
Italian Thistle	<i>Carduus pycnocephalus</i>
Mediterranean sage	<i>Salvia aethiopsis</i>
Musk Thistle	<i>Carduus nutans</i>
Scotch Broom	<i>Cytisus scoparius</i>
Tansy Ragwort	<i>Senecio jacobaea</i>
Wild – Proso Millet	<i>Panicum miliaceum</i>

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.

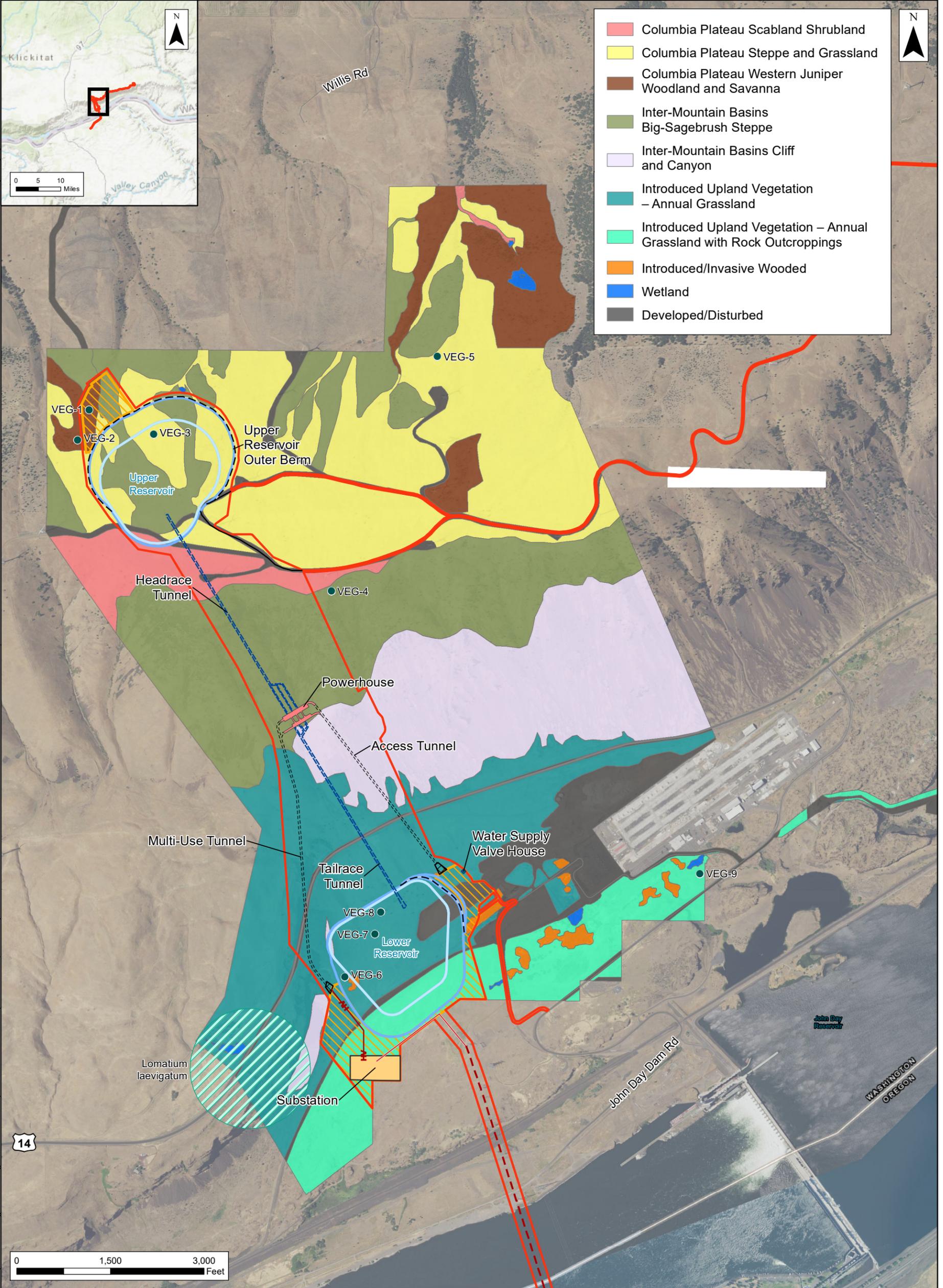
“Q” Class—Questionable List. A newly detected weed that may have some importance, but more information is needed to determine its impact on agriculture.

“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.



- Columbia Plateau Scabland Shrubland
- Columbia Plateau Steppe and Grassland
- Columbia Plateau Western Juniper Woodland and Savanna
- Inter-Mountain Basins Big-Sagebrush Steppe
- Inter-Mountain Basins Cliff and Canyon
- Introduced Upland Vegetation – Annual Grassland
- Introduced Upland Vegetation – Annual Grassland with Rock Outcroppings
- Introduced/Invasive Wooded
- Wetland
- Developed/Disturbed

**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**  
 Final License Application  
 Goldendale Energy Storage Project  
 Goldendale, WA

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

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

Scientific Name	Common Name	State Status	State Rank
<i>Penstemon barrettiae</i>	Barrett's beardtongue	T	S2
<i>Penstemon deustus</i> var. <i>variabilis</i>	hot-rock penstemon	T	S1
<i>Penstemon eriantherus</i> var. <i>whitedii</i>	Fuzzy tongue penstemon	T	S2
<i>Polygonum parryi</i>	Parry's knotweed	T	S1
<i>Potentilla newberryi</i>	Newberry's cinquefoil	X	SH
<i>Ranunculus hebecarpus</i>	downy butter-cup	T	S1
<i>Ranunculus tritermatus</i>	obscure buttercup	E	S1S2
<i>Rorippa columbiae</i>	Persistent sepal yellowcress	T	S1S2
<i>Rotala ramosior</i>	lowland toothcup	S	S2
<i>Salix sessilifolia</i>	soft-leaved willow	S	S2
<i>Scribneria bolanderi</i>	Scribner's grass	T	S1
<i>Sisyrinchium sarmentosum</i>	pale blue-eyed grass	T	S2
<i>Spiranthes porrifolia</i>	western ladies' tresses	S	S2
<i>Utricularia intermedia</i>	flat-leaved bladderwort	S	S2S3
<i>Veratrum insolitum</i>	Siskiyou false hellebore	E	S1
<i>Wyethia angustifolia</i>	California compassplant	S	S1
<i>Zeltnera muehlenbergii</i>	Monterey centauray	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
<i>Abronia mellifera</i>	White sandverbena	-	SNR	-
<i>Achnatherum hendersonii</i>	Henderson ricegrass	C	S2	-
<i>Allium robinsonii</i>	Robinson's onion	-	SX	-
<i>Ammannia robusta</i>	An ammannia	-	SNR	-
<i>Artemisia campestris</i> var. <i>wormskioldii</i>	Northern wormwood	E	SX	-
<i>Astragalus collinus</i> var. <i>laurentii</i>	Laurence's milk-vetch	T	S1	-
<i>Astragalus conjunctus</i> var. <i>conjunctus</i>	Idaho milk-vetch	-	SNR	-
<i>Astragalus conjunctus</i> var. <i>rickardii</i>	Rickard's milk-vetch	-	SNR	-
<i>Astragalus reventiformis</i>	Long-leaved milk-vetch	-	SNR	-
<i>Astragalus sclerocarpus</i>	Stalked-pod milk-vetch	-	SNR	-
<i>Cryptantha rostellata</i>	Beaked cryptantha	-	SNR	-
<i>Elymus lanceolatus</i> ssp. <i>psammophilus</i>	Sand-dune wild-rye	-	SNR	-
<i>Eriogonum thymoides</i>	Thyme-leaved buckwheat	-	SNR	-
<i>Erythranthe jungermannioides</i>	Hepatic monkeyflower	C	S3	-
<i>Hackelia diffusa</i> var. <i>cottonii</i>	Creamy stickseed	-	S3	-
<i>Heliotropium curassavicum</i>	Salt heliotrope	-	S2	-
<i>Juncus mexicanus</i>	Mexican rush	-	SNR	-
<i>Lomatium laevigatum</i>	Smooth desert parsley	-	S3	-
<i>Marsilea vestita</i>	Hairy water-fern	-	SNR	-
<i>Navarretia leucocephala</i> ssp. <i>leucocephala</i>	White-flowered navarretia	-	S4	-
<i>Orobanche ludoviciana</i> ssp. <i>ludoviciana</i>	Louisiana broomrape	-	SNR	-
<i>Pediocactus nigrispinus</i>	Snowball cactus	-	S4	-
<i>Penstemon acuminatus</i> var. <i>acuminatus</i>	Sand dune penstemon	-	SNR	-
<i>Penstemon deustus</i> var. <i>variabilis</i>	Hot-rock penstemon	-	S1S2	-
<i>Physaria douglasii</i> ssp. <i>douglasii</i>	Columbia bladderpod	-	SNR	-
<i>Spartina pectinate</i>	Prairie cordgrass	-	SNR	-
<i>Triglochin scilloides</i>	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	<i>Leptosiphon bolanderi</i>	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	<i>Orobanche californica</i> ssp. <i>grayana</i>	Endangered	Vernally moist meadows and lower montane meadows, parasitic on sagebrush, elevations sea level to 450 meters (DNR 2014b).
Common bluecup	<i>Githopsis specularioides</i>	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	<i>Cusickiella douglasii</i>	Threatened	Open rocky ridges on thin, sandy to gravelly soil over basalt, elevations 790-860 meters (DNR 2014b).
Few-flowered collinsia	<i>Collinsia sparsiflora</i> var. <i>bruceae</i>	Threatened	Thin soils over basalt on south-facing slopes; moist in spring, dry in summer; elevations 60–730 meters (DNR 2014b).
Hot-rock penstemon	<i>Penstemon deustus</i> var. <i>variabilis</i>	Threatened	Dry foothills and lowlands, open dry thin soils over basalt, elevations 500–1000 meters (DNR 2014b).
Inch-high rush	<i>Juncus uncialis</i>	Threatened	Vernal pools and pond edges, channeled scablands, and biscuit-swale topography; elevations 90–760 meters (DNR 2014b).
Nuttall's quillwort	<i>Isoetes nuttallii</i>	Sensitive	Seasonally wet ground, seepages, temporary streams, mud near vernal pools; elevations 60–405 meters (DNR 2014b).
Obscure buttercup	<i>Ranunculus triternatus</i>	Endangered	Meadow steppe, north-facing slopes, and basalt ridges in loess deposited soil; elevations 580–1220 meters (DNR 2014b).
Smooth goldfields	<i>Lasthenia glaberrima</i>	Threatened	Vernal ponds on basalt tablelands where the area is wet in winter and dry by late spring (DNR 2014b).
Smooth desert-parsley	<i>Lomatium laevigatum</i>	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	<i>Lomatium suksdorfii</i>	Sensitive	Open dry rocky hillsides on slopes; elevation 90–1100 meters; associated with Oregon white oak (DNR 2014b).
Western ladies' tresses	<i>Spiranthes porrifolia</i>	Sensitive	Wet meadows, bogs, streams, and seepage slopes; elevations 3–2075 meters (DNR 2014b).
Wormskiold's northern wormwood	<i>Artemisia campestris</i> var. <i>wormskioldii</i>	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 privileged) 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" referring to National Register of Historic Places Evaluation Criteria. The Report does not make explicit 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
<i>Achillea millefolium</i>	Yarrow
<i>Allium acuminatum</i>	Tapertip onion
<i>Lomatium laevigatum</i>	Smooth desert-parsley (State-Threatened Species)
<i>Lomatium nudicaule</i>	Barestem biscuitroot
<i>Lomatium triturnatum</i>	Nine-leaf biscuitroot
<i>Lomatium papilioniferum</i> (L. grayi)	Pungent desert parsley
<i>Lomatium macrocarpum</i>	Buiscuit root
<i>Lomatium dissectum</i>	Fernleaf buiscuitroot
<i>Balsamorhiza sagittata</i>	Arrowleaf balsamroot
<i>Crataegus</i> spp. ( <i>C. suksdorfii</i> or <i>C. douglasii</i> )	Black Hawthorne
<i>Rhus glabra</i>	Smooth sumac
<i>Juniperus occidentalis</i>	Western juniper
<i>Pinus ponderosa</i>	Ponderosa pine
<i>Eriogonum strictum</i> var. <i>proliferum</i>	Strict buckwheat

Scientific Name	Common Name
<i>Eriogonum thymoides</i>	Thyme-leaved buckwheat
<i>Eriogonum compositum</i>	Arrowleaf buckwheat
<i>Lupinus latifolius</i>	Columbia Gorge broad-leaf lupine
<i>Ericameria nauseosa</i>	Rubber rabbitbrush
<i>Fritillaria camschatcensis</i>	Chocolate lily
<i>Rosa nutkana</i>	Nootka rose
<i>Triteleia hyacinthina</i>	Brodiaea
<i>Cirsium undulatum</i>	Wavyleaf thistle
<i>Crepis atriobarba</i>	Slender hawksbeard
<i>Wyethia amplexicaillis</i>	Northern mule-ears
<i>Lewisia rediviva</i>	Bitterroot
<i>Erodium cicutarium</i>	Common stork's-bill
<i>Claytonia perfoliata</i>	Miner's lettuce
<i>Apocynum androsaemifolium</i>	Spreading dogbane
<i>Uropappus lindleyi</i>	Silver puffs
<i>Amsinckia menziesii</i>	Menzies' fiddleneck
<i>Celtis laevigata</i>	Netleaf hackberry
<i>Delphinium nuttallianum</i>	Nuttal's larkspur
<i>Amelanchier alnifolia</i>	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. Temporary impacts are associated only with the laydown areas. All other impacts are permanent.

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

Vegetation Type <sup>a</sup>	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 (IMBSS)	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
Total	54.4	90.5

<sup>a</sup> 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 681.6 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 Washington Department of Transportation Lands that the tunnel will cross under, and the WDNR lands crossed by the existing road that will be used to access the upper reservoir. 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 occurred 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;

DAHP Inventory No.	Project	Year	Entity	Description
				64 cultural resources identified
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 <sup>a</sup>	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

<sup>a</sup> 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 FLA) 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 Yakama Nation. Yakama Nation CRP 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**

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

#### 4.1.3.3 Known Cultural Resources in the Area of Potential Effect

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.

#### **4.1.4 Outstanding Survey and Evaluation of Historic Properties**

The APE has been surveyed for archaeological and historic architectural resources, as well as TCPs that are significant to the Yakama Nation. Outstanding cultural resource investigations include:

- Conducting additional survey to correct the boundary of the Push-Pum TCP so that it properly incorporates connected plant resources as documented in 1995 and 2019 (per the recommendation of Yakama Nation);
- Evaluating the Columbia Hills Multiple Property Documentation (MPD) TCP under NRHP Criterion B, C, and D (per the recommendation of Yakama Nation);
- Identifying historic properties of religious and cultural significant to the Confederated Tribes of the Umatilla Indian Reservation (CTUIR);
- Evaluating Sites 45KL566, 45KL567, 45KL570, 45KL744, 45KL746, and LS-3 for the NRHP both individually and for their contribution to the Push-Pum TCP, Columbia Hills MPD TCP, and Columbia Hills Archaeological District assessing Project effects to the Push-Pum TCP, Columbia Hills MPD TCP, the Columbia Hills Archaeological District, any identified historic properties of religious and cultural significant to the CTUIR, and any of the archaeological resources that are determined to be eligible for the NRHP; and
- Mitigating any identified adverse effects.

All outstanding work listed above will be completed prior to Project construction.

#### **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 draft 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 the evaluation of 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, the Washington SHPO, the Oregon SHPO (if cultural resources extend into Oregon), and, if appropriate, the Advisory Council on Historic Preservation. 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 outlined 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**

A summary of comments received from Tribes and other groups is included in Section 11 (Consultation) of this Exhibit, as well as Appendices H and L of this FLA. Once FERC initiates formal Consultation under Section 106, the Applicant will meet its obligations through execution of an Memorandum of Understanding (MOU) between FERC and the Applicant. It is the Applicant's intention to work closely with Tribes during the continued development of the HPMP to ensure that it appropriately considers properties of religious and cultural significance. 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 (see Appendix G).

If archeological resources are discovered in the Project Boundary during the future studies described in Section 4.1.4 herein, 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 shown in Table 5.2-1 below.

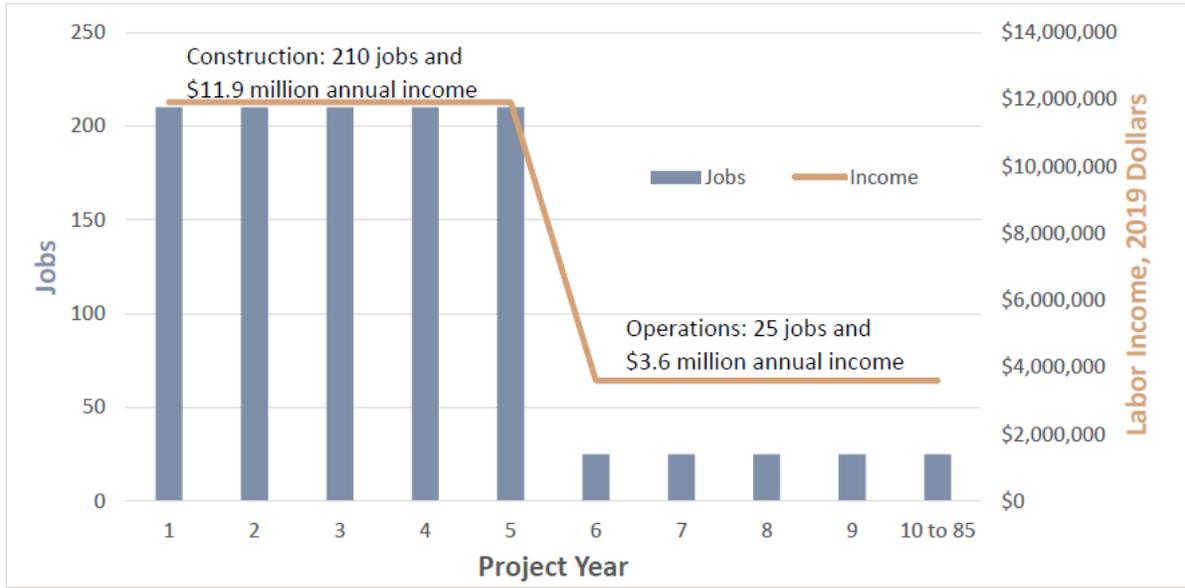
**Table 5.2-1: Total Economic Impacts by Location of Residency in the 2019 Study**

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

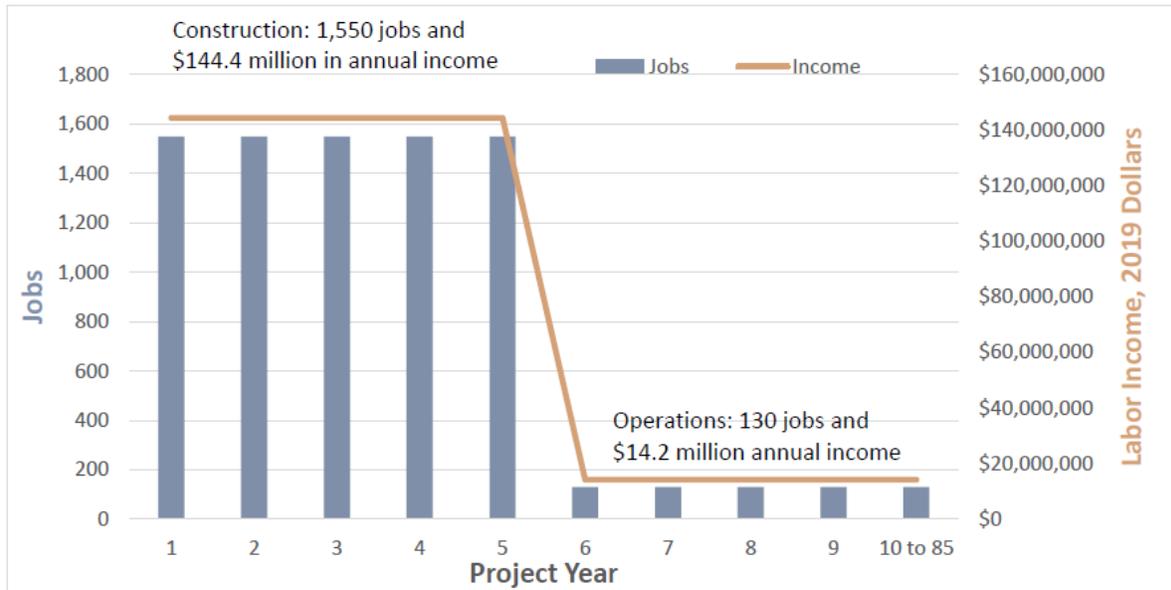
The 2019, economic analysis used the Davis-Bacon 2019 prevailing wage and fringe benefits for construction equipment operators in Klickitat County, Washington, and the Dalles/Hood River, Oregon, with a mid-point of approximately \$54 per hour or \$112,000 per year, assuming 2,080 annual hours of compensation, 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**

	<b>Total Housing Units (number)</b>	<b>Total Vacancies (number)</b>	<b>Vacant Housing Units (%)</b>
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 million 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**

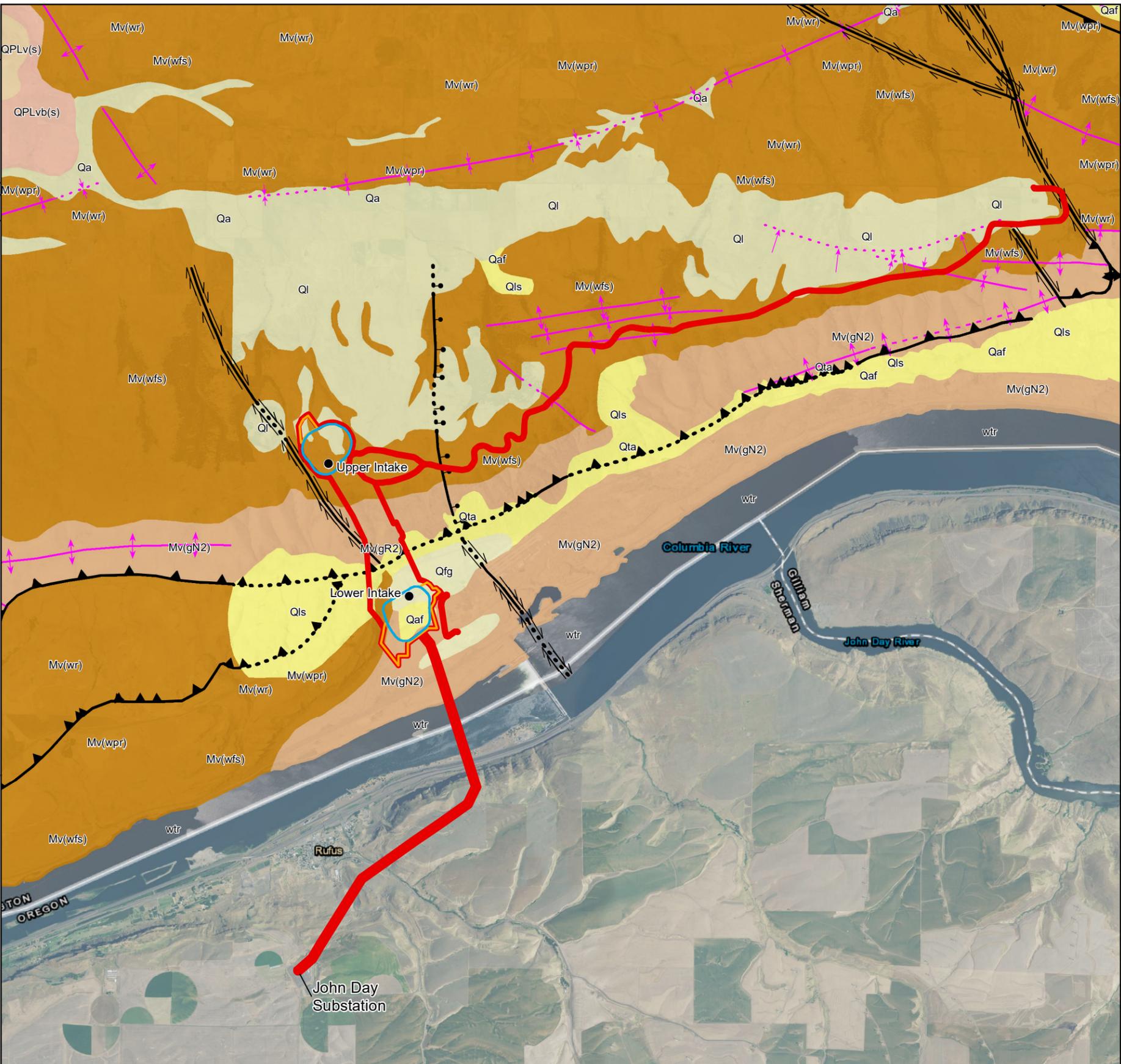
As proposed in the PAD, an updated socioeconomic analysis of the proposed Project impact was completed in 2019; these results are reported above and available in Appendix I. No additional recommendations are made.

## **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: 6/12/2020 Project: 0483340  
 FILE: M:\Projects\Goldendale Energy Storage Project\maps\FLA 2020\Figure 6.1-1 Project Geology.mxd | REVISED: 06/12/2020 | SCALE: 1:63,360 when printed at 11x17



**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 existence certain, location accurate [31]

**Monocline, synclinal bend - Identity and existence certain, location concealed [27]**

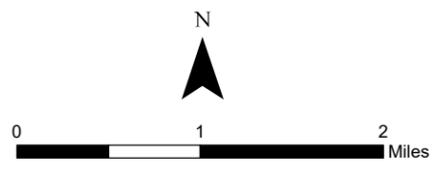
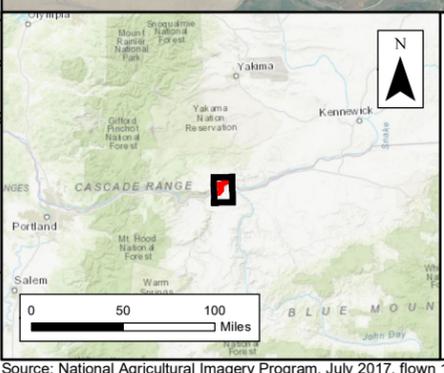
**Washington Geologic Units**

**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)

**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



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

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	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			
	Middle	Columbia River Basalt Group	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						
Lower	Columbia River Basalt Group	Grande Ronde Basalt	Member of Sentinel Bluffs	15.6	N <sub>2</sub>	
			Member of Slack Canyon			
			Member of Field Springs			
			Member of Winter Water			
			Member of Umtanum			
			Member of Ortley	R <sub>2</sub>		
			Member of Armstrong Canyon			
			Member of Meyer Ridge			
			Member of Grouse Creek			
			Member of Wapshilla Ridge			
			Member of Mt. Horrible	N <sub>1</sub>		
			Member of China Creek			
			Member of Downey Gulch			
			Member of Center Creek			
			Member of Rogersburg			
Member of Teepee Butte	R <sub>1</sub>					
Member of Buckhorn Springs						
Innaha Basalt	Columbia River Basalt Group			17.5	R <sub>1</sub>	
					T	
					N <sub>0</sub>	
					R <sub>0</sub>	

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

### **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 Ginkgo 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 Horseflat, 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 haploxeroll soils; Horseflat sobby 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);
- Groundwater contamination attributable to the CGA smelter site in the Uppermost Aquifer beneath the southern portion of the Project;
- Slope stability/mass soil movement;
- Water erosion and windblown dust; and
- Seismicity.

### **6.2.1 Former Smelter Site**

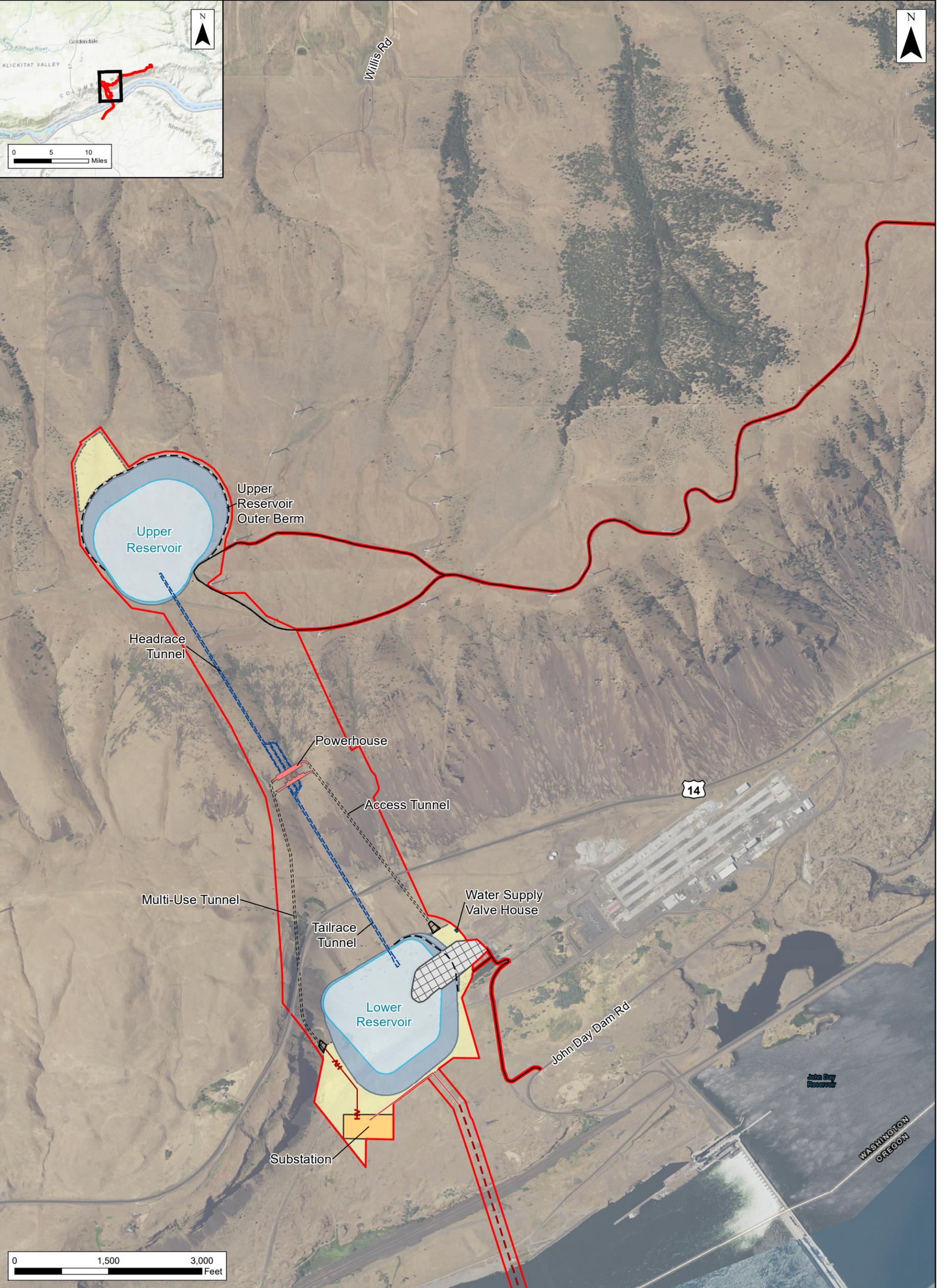
The former CGA smelter generally operated from 1969 to 2003 and generated wastes ranging from sulfur dioxide scrubber wastewater to various metals (particularly fluoride, iron, manganese, and sodium), chlorides, sulfate, cyanide, and phenols. Waste materials were disposed of off-site and on-site. Some 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, LLC and Lockheed Martin Corporation (“Potentially Liable Persons”), a Remedial Investigation (RI) and Feasibility Study was initiated at the Site, and the Potentially Liable Parties (PLPs) submitted a Draft RI Report to Ecology in January 2019 (Tetra Tech, Inc. et al. 2019). The objective of the report included characterization of the nature and extent of the contamination associated with operation of the smelter, assesses human and ecological risks, and propose response measures to mitigate any identified adverse risks. Ecology and other stakeholders provided review comments to the PLPs in June 2019. Based on consultation by the Applicant with the PLPs, the response to those comments is currently under negotiation. The result of those negotiations will describe additional investigation or studies that may be required for the smelter site.

Within the proposed Project Boundary, the lower reservoir is located over the footprint of one of the CGA smelter SWMUs, the WSI (SWMU 4) (Figure 6.2-1). As detailed on Figure 6.2-1, there are no other SWMUs located within the Project Boundary. The WSI was used to concentrate emission control wastewater through evaporation and for storage and disposal of air emission control sludge. Testing conducted by the CGA smelter operator in 1997, when compared to Ecology regulations, confirmed that the materials placed in the WSI were non-hazardous and non-dangerous wastes (Ecology 1997). 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 WSI contents 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 were 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).

As noted above, the lower reservoir for the Project is located in the area of the WSI. The proposed Project design includes removal of all of the WSI (liners and contents of the WSI) because they are unsuitable for reservoir construction. Section 6.3 herein provides a discussion of the proposed plans for removing the WSI prior to construction of the lower reservoir.

Groundwater impact attributable to the operations of the CGA smelter was documented in the Draft RI Report, noted above, in the Uppermost Aquifer beneath the WSI and southernmost portions of the Project (Tetra Tech, Inc. et al. 2019). The Uppermost Aquifer is termed an Area of Concern in documents related to the CGA smelter. There are no structures planned for the Project that would be directly affected by the contaminated groundwater in the Uppermost Aquifer, and there are no plans to use that groundwater for the Project. However, some of the groundwater monitoring wells required by the PLPs for the CGA smelter site for long-term monitoring may be impacted by construction of the Project, and certain structures of the Project (e.g., the lower reservoir and water transmission pipelines) will be designed and constructed to mitigate the potential to exacerbate groundwater impact attributable to the CGA smelter site. Section 6.3 herein presents a discussion of the proposed plans for Project activities related to the Uppermost Aquifer Area of Concern.



**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**  
 Final License Application  
 Goldendale Energy Storage Project  
 Goldendale, WA

### **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 volcanoclastic 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 Storm Water Pollution Prevention Plan will be prepared consistent with the Ecology 2019 Stormwater Management Manual for Eastern Washington (Ecology 2019e). Specifically, Chapter 5 of that Ecology publication presents methodologies for selecting and construction of runoff control and treatment BMPs for managing stormwater dependent on average annual precipitation, site ground conditions, seasonal considerations, and potential for construction contaminants (e.g., petroleum products) in the stormwater runoff. 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 Emergency Cleanup Plan (SPECP) to address potential issues resulting from spills of hazardous substances during construction, operations, or maintenance. The Hazardous Substances SPECP will:

- Describe the Project and nature of operations at the Project;
- List the general types of chemicals in use and storage at the Project;
- Include a Project plan map indicating hazardous substance storage areas;
- Specify materials handling procedures and storage requirements; and
- Identify spill cleanup procedures for areas and processes in which spills may occur.

Institutional BMPs associated with the Hazardous Substance SPECP will include:

- Training key personnel in the implementation of the SPECP;
- Posting summaries of the SPECP around the Project to facilitate implementation of response actions; and
- Revising the SPECP as conditions or operations change at the Project (e.g., construction to operational).

Operational BMPs associated with the Hazardous Substances SPECP will include:

- Notifying regulatory agencies, including local authorities, in accordance with applicable federal and state regulations if a spill may reach surface water or groundwater;
- Locate emergency spill containment and cleanup kits (appropriate to the hazardous substances in use) in areas where they are easily accessed and used, with locations modified or moved as operations and activities change/progress at the Project.

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 and non-dangerous waste produced by historical operations of the CGA smelter. The WSI is composed of materials that are unsuitable from an engineering perspective for construction of the Lower Reservoir. The

Washington Model Toxics Control Act, Revised Code of Washington Chapter 70.105D, provides a mechanism whereby Ecology and the Washington Attorney General's Office (AGO) can enter into a settlement with a person not currently liable at a facility and who proposes to purchase, redevelop and reuse that facility. This type of settlement is termed a "prospective purchaser agreement" that is implemented and enforced by means of a consent decree between the AGO and the settling party. The Applicant is actively engaged in the consultation process required to enter into a prospective purchaser agreement consent decree with the AGO to describe and govern the removal of the WSI, as follows:

- Initial Application for a prospective purchaser agreement was prepared in accordance with WAC 173-340-520 and Ecology Toxics Cleanup Program Policy 520B, and was submitted to Ecology and the Washington AGO on December 4, 2019;
- Applicant met with representatives from the Washington AGO and Ecology in Olympia, Washington, on January 29, 2020, to discuss the Initial Application;
- Teleconference with the Washington AGO and Ecology staff on February 19, 2020; and
- Teleconference with Ecology environmental staff, Washington staff representing the Executive Advisor for Tribal Affairs, and the Clean Tech section lead for the Washington Governor's office on April 21, 2020.

A letter from Ecology supporting the prospective purchaser agreement for the Project (Ecology 2020). Following submittal of this FLA, the Applicant will be submitting to Ecology and the Washington AGO a prospective purchaser agreement detailed proposal (WAC 173-340-520) describing current environmental conditions at the WSI, and a detailed description of the steps to be taken to implement removal of the WSI. The proposed plan—presented in the Initial Application, discussed with the Washington AGO and Ecology, and presented in detail in the Prospective Purchaser Agreement Detailed Proposal—is that the entire contents of the WSI will be excavated and disposed off-site, along with the liner materials beneath the contents and the cover materials placed over the WSI at the time of the closure of the WSI in 1994. The Prospective Purchaser Agreement Detailed Proposal, once finalized with Ecology, will provide the basis for the prospective purchaser agreement consent decree to be entered into between the Applicant and the Washington AGO.

As noted in Section 6.2.1 herein, impact attributable to operations on the CGA smelter site is present in the groundwater beneath the southernmost portion of the Project area. That groundwater impact is monitored, in part, by a series of monitoring wells within the Project Boundary. There are monitoring wells immediately adjacent to the WSI that will require removal along with the WSI, and there are monitoring wells that will potentially be impacted in areas of heavy construction activity and traffic. The Applicant will consult with Ecology and the PLPs for the CGA smelter site to determine which wells will be decommissioned and how those wells will be replaced, as required to continue effective monitoring of impact in the Uppermost Aquifer. For planning and budgeting purposes, the Applicant is assuming that as many as 15 to

20 monitoring wells may require decommissioning, with a similar number of new wells installed as replacements. Those monitoring wells and monitoring wells installed by the CGA smelter operator to monitor the WSI will be decommissioned in accordance with Washington regulations (WAC 173-160) prior to the beginning of construction and during the removal of the WSI. 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 replacement groundwater monitoring wells. Those replacement monitoring wells will be constructed in accordance with the standards then current.

The Applicant's Initial Application for the prospective purchaser agreement described a plan of action to address the WSI and the existing monitoring wells in a manner that would not adversely impact the ongoing investigation and cleanup of the CGA smelter site. Ecology concurred with the Applicant that "the proposed project is not likely to...interfere with necessary remedial actions..." (Ecology 2020).

## **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.

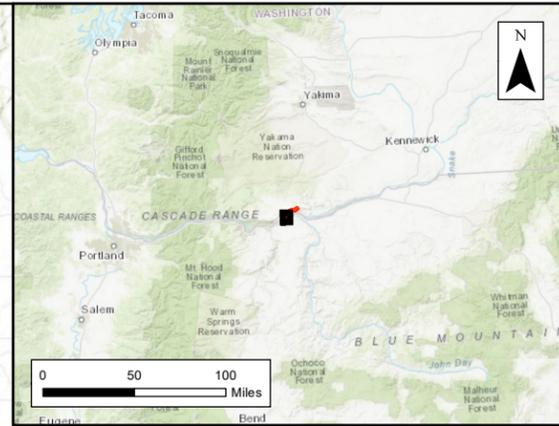
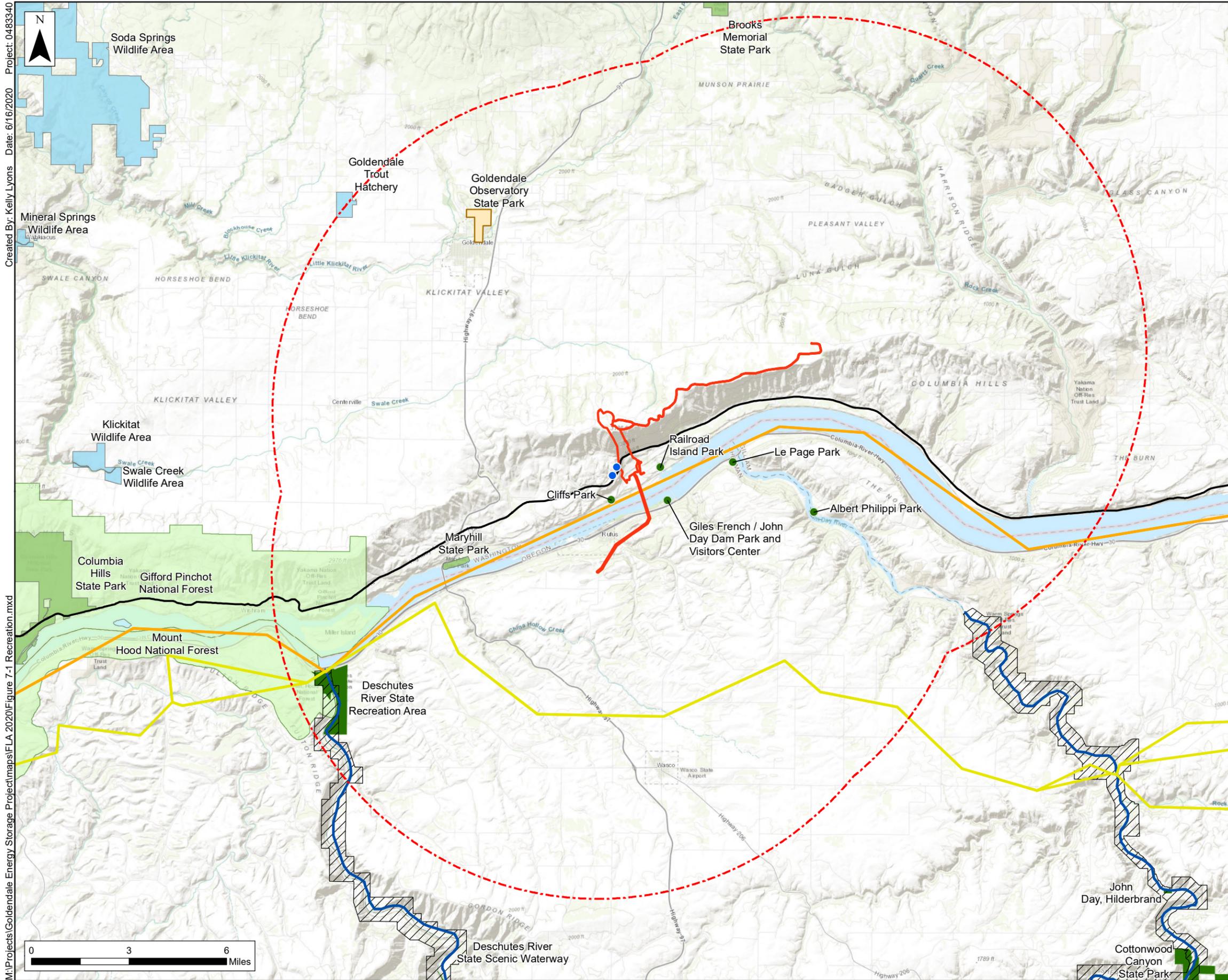
Within a 10 mile radius of the Project, most land ownership is private, thus recreation opportunities are relatively limited. There are several parks (i.e., Goldendale Observatory, Goldendale Hatchery, Maryhill State Park, Railroad Island Park, Cliffs Park, LePage Park, and Giles French Park) within 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**

<b>Name</b>	<b>Primary Activity</b>	<b>Operator</b>	<b>Distance to the Project (miles)</b>	<b>Comments</b>
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 <sup>1</sup>	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



**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**  
 Final License Application  
 Goldendale Energy Storage Project  
 Goldendale, WA

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

### **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.

## 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. Reservoirs will be fenced to a minimum height of 8 feet with chain link fence. Weather permitting, fences will be monitored on at least a weekly basis when staff are present at the reservoirs, and any damage (e.g., vandalism) will be fixed immediately as it is practicable. 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.

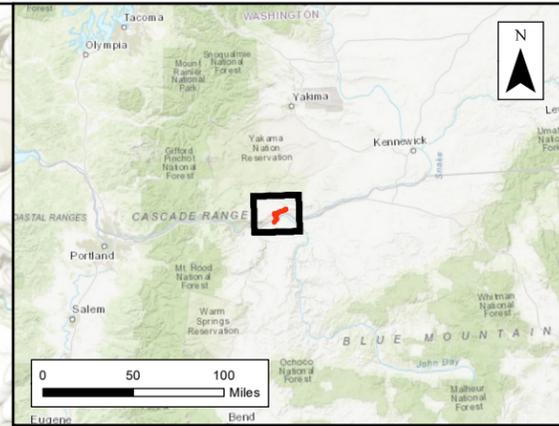
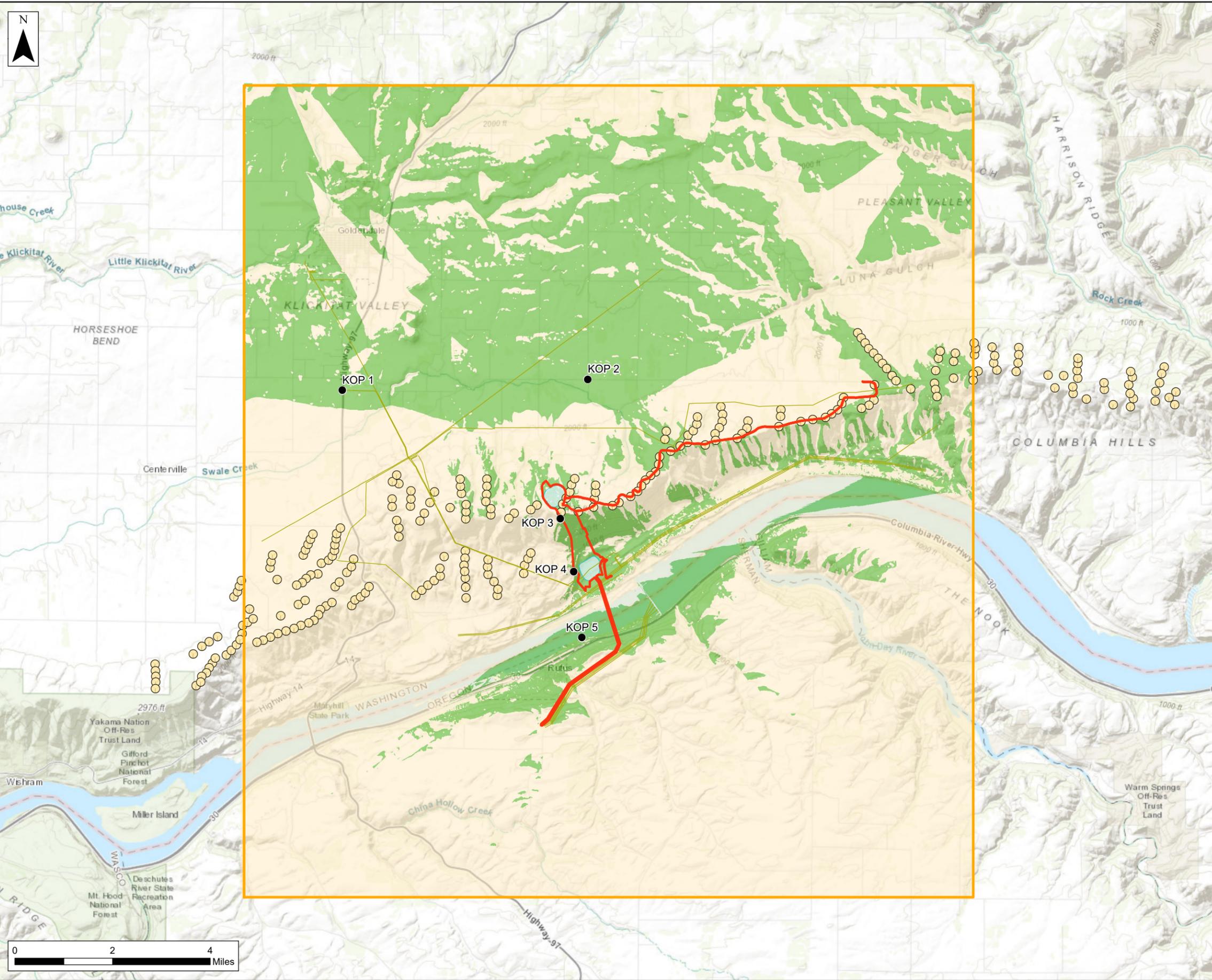
## **8.0 AESTHETICS**

### **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.



**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

**Figure 8.8-1**  
**Project Viewshed**  
 Final License Application  
 Goldendale Energy Storage Project  
 Goldendale, WA

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

## 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 Hocter 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 FLA), 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 Exhibit E, 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 cranes will 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 FLA. 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**

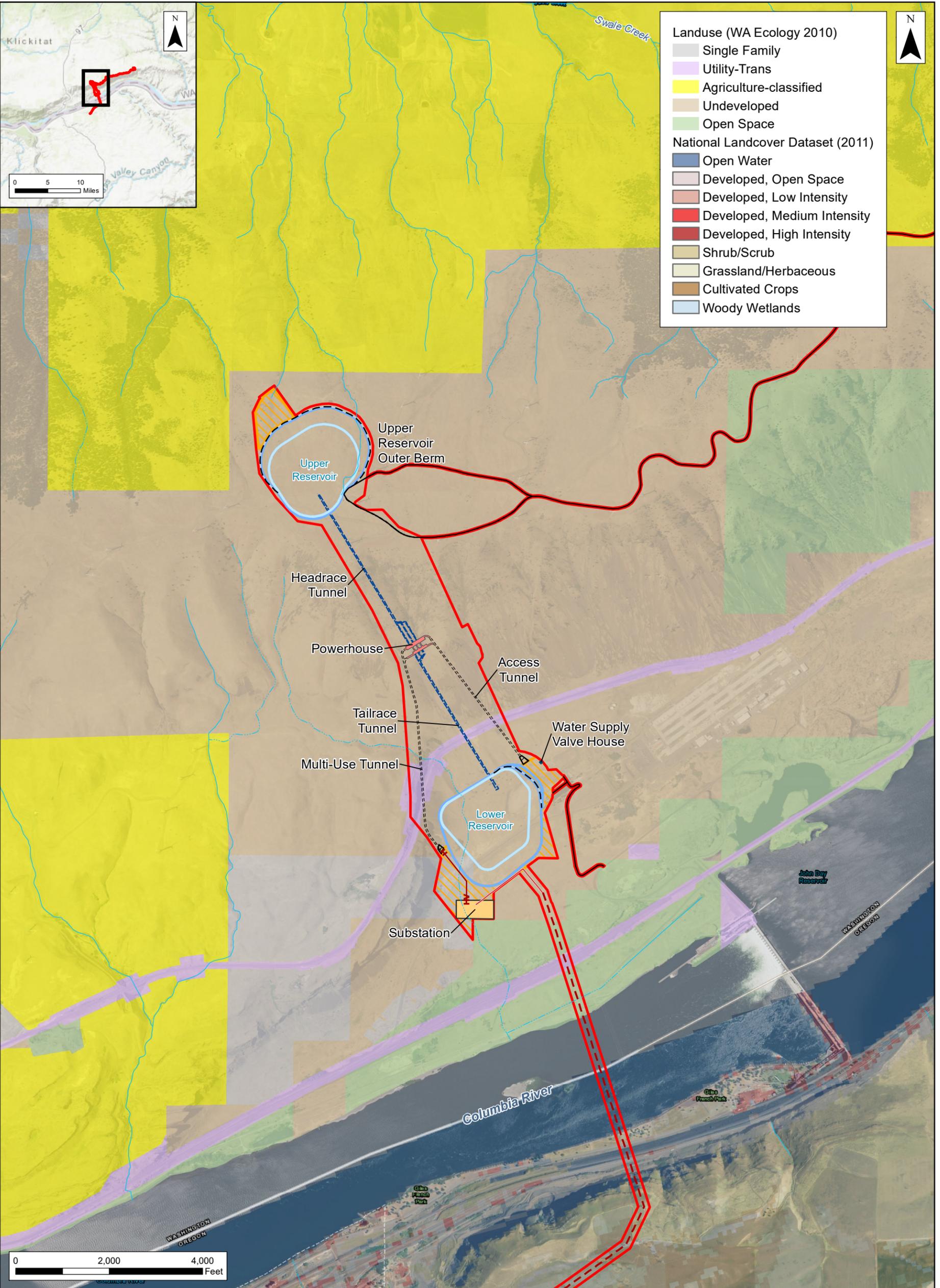
The closest town is Goldendale, Washington, located in Klickitat County, approximately 8 miles northwest of the Project area. Goldendale has an estimated population of 3,485 residents (U.S. Census Bureau 2018). The next closest town is The Dalles, Oregon, approximately 21 miles southwest and in Wasco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



- Landuse (WA Ecology 2010)**
- Single Family
  - Utility-Trans
  - Agriculture-classified
  - Undeveloped
  - Open Space
- National Landcover Dataset (2011)**
- Open Water
  - Developed, Open Space
  - Developed, Low Intensity
  - Developed, Medium Intensity
  - Developed, High Intensity
  - Shrub/Scrub
  - Grassland/Herbaceous
  - Cultivated Crops
  - Woody Wetlands

- 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 9.9-1**  
**Proposed Project Boundary and Adjacent Land Uses**  
 Final License Application  
 Goldendale Energy Storage Project  
 Goldendale, WA

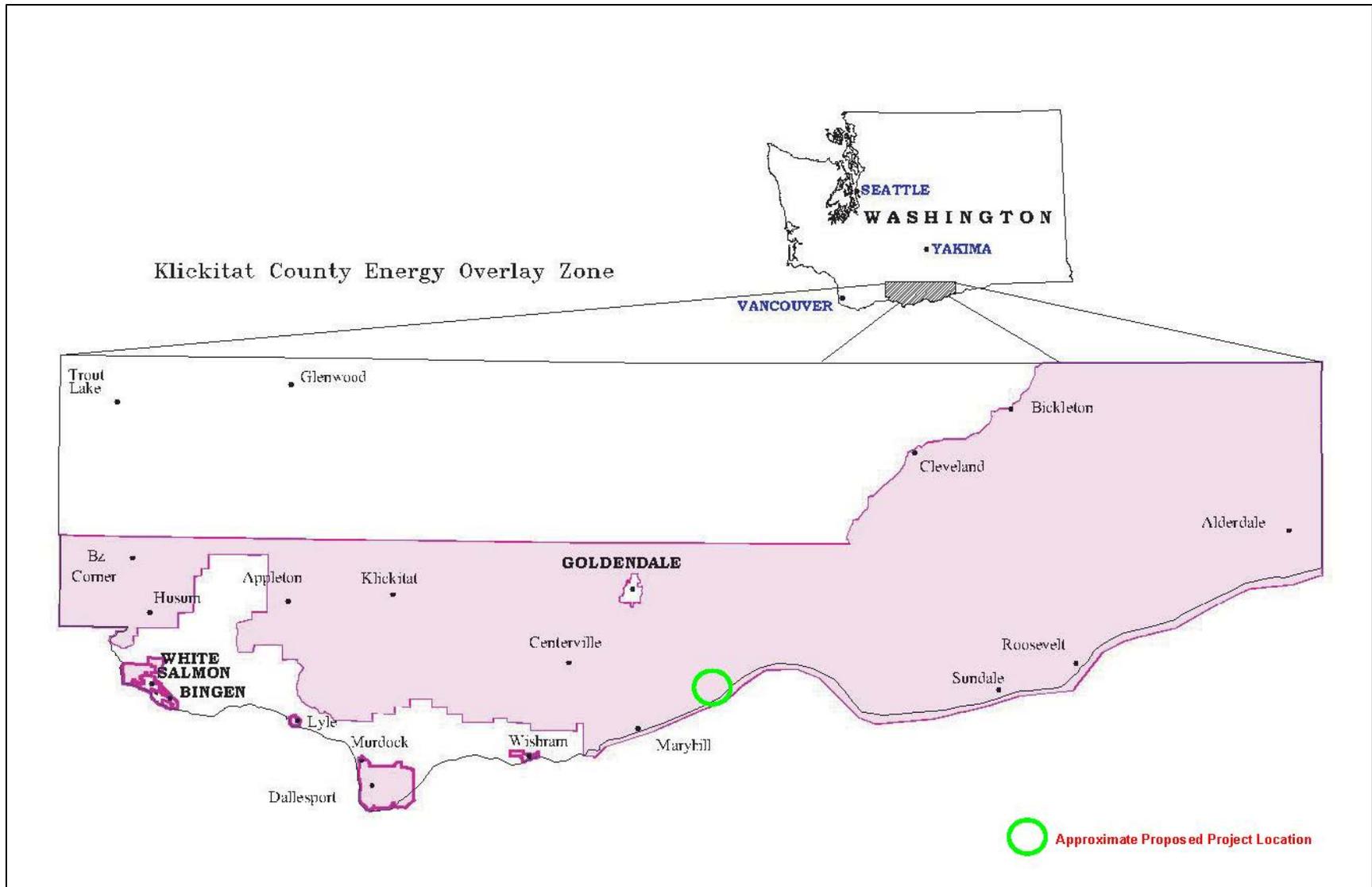
### 9.1.1 Zoning

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.<sup>1</sup> 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.

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<sup>1</sup> 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 NOISE**

The following section discusses noise produced in the proposed Project area that may affect people and wildlife near the Project.

### **10.1 Potential Impacts**

Construction- and operation-related noise has the potential to increase ambient sounds and disturb residents and wildlife. The Project is relatively distant from potential human receptors as it is located on private property and surrounded by private and industrial-use land. It is unlikely that noise generated from construction and operation will affect the closest isolated resident to the Project area living approximately 0.4 mile away. Potential Project noises that could be attributed to the Project primarily consist of short-term construction noise produced during heavy earthwork. For example, during construction of the reservoirs, blasting has the potential to be an intermittent annoyance to residents.

#### **10.1.1 Construction Noise**

Construction of the Project is anticipated to occur over a 5-year period. Estimates for type, number, duration, and location of heavy equipment are unknown at this time. It is anticipated that construction activities that generate noise will occur between the hours of 7 a.m. and 6 p.m., Monday through Friday, but will be in accordance with the proposed contractor's schedule. It is common for a project of this magnitude to be constructed under a two-shift or three-shift schedule, generally excluding any significant construction over the weekends. Most of the noise-generating Project construction will occur at the upper and lower reservoir sites. Construction equipment will include large excavators, scrapers, cranes, loaders, dump trucks, and miscellaneous material delivery by over-the-road semi-tractor trailers. There will also be explosive blasting for rock excavation for the reservoirs and powerhouse. It is also likely that a portable concrete batch plant will be erected on site to produce concrete for the Project.

Construction noise can vary greatly and depends on the activity, duration, and equipment used. The Federal Highway Administration's (FHWA) Roadway Construction Noise Model User's Guide (Volpe 2006) predicts noise levels for heavy equipment typically found at large construction sites based upon the maximum A-weighted decibel (dBA) sound level measured at a distance of 50 feet (Table 10.1-1). The Occupational Safety and Health Administration states that exposure to 90 decibels (dB) for up to 8 hours is acceptable without ear protection. According to the FHWA handbook, most construction equipment is below 90 dB at a distance of 50 feet from the source. Doubling the distance from the noise source generally lowers the noise level by 6 dB. Thus, if the sound is 90 dB at 50 feet, a distance of 800 feet would dampen the level to less than 66 dB, which is approximately equal to normal conversation level. Surface blasting will have periodic noise impacts, but public access and existing residential buildings are located at significant distances from the areas any areas where blasting may occur, minimizing

these noise impacts. The nearest receptor to the lower reservoir is a single residence on the west side of State Route 14 (Lewis and Clark Highway); this residence is approximately 0.4 mile away from the proposed lower reservoir. At this distance, construction vehicles will not be noticed; however, blasting will be heard. The nearest receptors to the proposed upper reservoir are infrequently used agricultural buildings to the north, approximately 1.2 miles from the upper reservoir. Both blasting and construction vehicles will have minimal noise effects at that distance.

Natural attenuation of noise over flat surfaces average 3 dBA for smooth surfaces and 4.5 dBA over natural surfaces at each measured doubling distance (Ambient Consulting 2010). Shielding is an important feature to consider in noise attenuation. Natural buffers such as trees can reduce noise by 5 to 8 dBA per 100 feet (Bentrup 2008). Land forms such as hills can significantly reduce noise as well by redirecting the energy, effectively reducing noise by 15 dBA if a few feet higher than the line of site (FHWA 2010). Because of the topography and vegetation present, it is estimated that natural attenuation of sound from construction of the Project will be on the order of 6 dBA for each doubling distance. The loudest construction activities including blasting and vibratory drilling or hammering will be around 95 dBA 50 feet from the source (Table 10.1-1).

Noise generated along access highways and Project roads will be limited, with most heavy equipment remaining on site. However, as Project features are completed, some heavy equipment will be removed from the site, while other equipment may arrive on site during different phases of the Project. It is unlikely that Project traffic will affect residents during construction. Blasting during construction should be limited to the reservoirs and powerhouse area. The duration of and sound intensity of blasting will depend upon geologic site conditions and will be determined during more detailed Project design.

Since the Project will be constructed in rural areas that are located away from noise-sensitive uses and regularly include machinery noise from trucking, wind farm operations, and agricultural practices, it is unlikely that there will be a perceived change in overall noise levels.

**Table 10.1-1: Federal Highway Administration Road Construction Noise Modeling Database**

Equipment Description	Impact Device	Acoustical Use Factor (percent)	Speck 721,560 Lmax at 50 feet (dBA, slow)	Actual Measured Lmax at 50 feet (dBA, slow) <sup>a</sup>	Number of Actual Data Samples
All other equipment > 5 horsepower	N	50	85	N/A	0
Auger drill rig	N	20	85	84	36
Backhoe	N	40	80	78	372
Bar bender	N	20	80	N/A	0
Blasting	Y	N/A	94	N/A	0
Boring jack power unit	N	50	80	83	1
Chain saw	N	20	85	84	46

Equipment Description	Impact Device	Acoustical Use Factor (percent)	Speck 721,560 Lmax at 50 feet (dBA, slow)	Actual Measured Lmax at 50 feet (dBA, slow) <sup>a</sup>	Number of Actual Data Samples
Clam shovel (dropping)	Y	20	93	87	4
Compactor (ground)	N	20	80	83	57
Compressor	N	40	80	78	18
Concrete batch plant	N	15	83	N/A	0
Concrete mixer truck	N	40	85	79	40
Concrete pump truck	N	20	82	81	30
Concrete saw	N	20	90	82	55
Crane	N	16	85	79	405
Dozer	N	40	85	80	55
Drill, rig truck	N	20	84	76	22
Drum mixer	N	50	80	81	1
Dump truck	N	40	84	74	31
Excavator	N	40	85	81	170
Flatbed truck	N	40	84	74	4
Front end loader	N	40	80	79	96
Generator	N	50	82	81	19
Generator (< 25 thousand volt-amperes VMS signs)	N	50	70	73	74
Gradall	N	40	85	83	70
Grader	N	40	85	N/A	0
Grapple (on backhoe)	N	40	85	87	1
Horizontal boring hydro jack	N	25	80	82	6
Hydra break ram	Y	10	90	N/A	0
Impact pile driver	Y	20	95	101	11
Jackhammer	Y	20	85	89	133
Man lift	N	20	85	75	23
Mounted impact hammer	Y	20	90	90	212
Pavement scarifier	N	20	85	90	2
Paver	N	50	85	77	9
Pickup truck	N	40	55	75	1
Pneumatic tools	N	50	85	85	90
Pumps	N	50	77	81	17

Equipment Description	Impact Device	Acoustical Use Factor (percent)	Speck 721,560 Lmax at 50 feet (dBA, slow)	Actual Measured Lmax at 50 feet (dBA, slow) <sup>a</sup>	Number of Actual Data Samples
Refrigerator unit	N	100	82	73	3
River buster / chinning gun	Y	20	85	79	19
Rock drill	N	20	85	81	3
Roller	N	20	85	80	16
Sand blaster (single nozzle)	N	20	85	96	9
Scraper	N	40	85	84	12
Shears (on backhoe)	N	40	85	96	5
Slurry plant	N	100	78	78	1
Slurry trenching machine	N	50	82	80	75
Soil mix drill rig	N	50	80	N/A	0
Tractor	N	40	84	N/A	0
Vacuum excavator	N	40	85	85	149
Vacuum street sweeper	N	40	80	82	19
Ventilation fan	N	100	85	79	13
Vibrating hopper	N	50	85	87	1
Vibratory concrete mixer	N	20	80	80	1
Vibratory pile driver	N	20	95	101	44
Warning horn	N	5	85	83	12
Welder/torch	N	40	73	74	5

Sources: Volpe 2006

Lmax = maximum sound level; VMS = variable message signs

<sup>a</sup> Samples averaged

### 10.1.2 Operations Noise

Operational noise from the Project is expected to be negligible. There will be no mitigation necessary for generation noise. Noise generated from the turbine-generator system will be the greatest source of operational noise. Given the attenuation rates and that the powerhouse is located underground, noise levels will not contribute to elevated ambient noise beyond 500 feet of the powerhouse, penstock, and substation. It is probable that some sort of alarm system will be used to alert bystanders to the start of pumping from one reservoir to the other, although recreational use of the reservoirs is prohibited. This will create a short term local noise, but will be intentional as a safety feature and should not be mitigated.

## **10.2 Applicant Recommendations**

The Applicant will make a conscious effort to minimize auditory impacts and protect the rural setting that currently exists in the Columbia Gorge. Operational noise from the Project is expected to be negligible. Because of the isolated nature of the Project location, no specific mitigation is proposed to reduce noise during Project construction or operation.

## 11.0 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 FLA. Copies of all correspondence regarding the Project have been included in Appendix F, and responses to all comments received on the Draft License Application (DLA) are included in Appendix L. The Applicant will continue to engage in consultation with relevant agencies during preparation of the Project's National Environmental Policy Act analysis and eventual license order.

### 11.1 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-filing 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 regarding 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

Activity	Responsibility	Time Frame	Completion Date
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 13, 2019
Agency and public comments on DLA	Agencies & Public	90 days from issuance of DLA	March 13, 2020
File FLA	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, FLA = Final License Application

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 South Columbus Avenue  
Goldendale, Washington 98620

## 11.2 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.

### **11.3 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, tribes, and non-governmental organizations. These comments and Applicant's responses are summarized below and organized by resource area. Comments from agencies and stakeholders received after DLA filing are addressed in more detail in the comment response matrix in Appendix L. All public correspondence is included in Appendix F of this FLA. Confidential correspondence is included in Appendix H (filed as privileged).

#### **11.3.1 Project Design and Features**

Clarification and refinement of Project features, the Project Boundary, construction practices, and Project operations have been requested from agencies and FERC. These comments have led to the development of Project alternatives, selection of the Project design, and refinement of (1) the Project design as presented in Exhibit A, (2) anticipated Project operations as described in Exhibit B, (3) the construction schedule in Exhibit C, (4) the Project Boundary shown in Exhibit G, and (5) engineering details shown in Exhibit F. Additionally, some refinements to Project design, construction, and operation were made due to resource-specific comments discussed below.

#### **11.3.2 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 will 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 evaporation from 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. Additional details regarding the Project's Reservoir Water Quality Monitoring Program are also provided in response to comments received (see Appendix L).

### **11.3.3 Aquatic Resources**

Comments regarding aquatic resources were received from USFWS and Oregon Department of Fish and Wildlife (ODFW).

#### *11.3.3.1 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 Pumped Storage Hydroelectric Project (JD Pool Project, FERC No. 13333). 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.

#### 11.3.3.2 *Oregon Department of Fish and Wildlife*

December 20, 2018—ODFW stated that they support the National Marine Fisheries Service (NMFS) comments dated October 29, 2014, that were made on a previous proposed project, 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.

#### 11.3.4 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.

Date	Purpose
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.
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 1 <sup>st</sup> 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 ( <i>Falco mexicanus</i> ) 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.
March 3, 2020	Letter from Brad Thompson (USFWS) to Kimberly Bose (FERC) commenting on the DLA.

Date	Purpose
March 10, 2020	Letter from Kessina Lee (WDFW) to Kimberly Bose (FERC) commenting on the DLA.
March 24, 2020	Letter from Erik Steimle (Rye Development) to Brad Thompson (USFWS) providing more information about habitat impacts and asking about compensatory mitigation ratios.
March 24, 2020	Letter from Erik Steimle (Rye Development) to Kessina Lee (WDFW) providing more information about habitat impacts and asking about compensatory mitigation ratios.
April 13, 2020	Letter from Patrick Verhey (WDFW) to Erik Steimle (Rye Development) commenting on compensatory mitigation for wildlife habitat impacts, including acceptable mitigation ratios.

#### 11.3.4.1 *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 1 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.

USFWS commented on the DLA with concerns regarding wildlife, threatened and endangered species, and eagles. The Applicant will work with FERC to consult with the USFWS per Section 7 requirements, including developing a list of ESA species in the Project area, and preparation of a Biological Assessment, if deemed necessary. The gray wolf is the only ESA-listed species identified by the Applicant as having potential habitat in the Project area. A more detailed response to these comments is provided in Appendix L, with relevant changes to the DLA reflected in this FLA. Additionally, USFWS requested specific information on

compensatory mitigation for temporary and permanent impacts to protect wildlife habitat. Based on this comment, the Applicant sent a letter to USFWS March 24, 2020, describing their intent to purchase mitigation lands at a 2:1 ration representing habitat values impacted by the Project (upper reservoir area) and asking for assistance from local wildlife management agencies to select appropriate parcels for mitigation.

#### *11.3.4.2 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.

WDFW commented on the DLA with concerns regarding avian resources including bats, golden eagles, bald eagles, and prairie falcons. Response to these comments is provided in Appendix L, with relevant changes to the DLA reflected in this FLA. Additionally, WDFW requested specific information on compensatory mitigation for temporary and permanent impacts to protect wildlife habitat. Based on this comment, the Applicant sent a letter to WDFW March 24, 2020, describing their intent to purchase mitigation lands at a 2:1 ration representing habitat values impacted by the Project (upper reservoir area) and asking for assistance from local wildlife management agencies to select appropriate parcels for mitigation. WDFW responded April 13, 2020, with support of this mitigation proposal and additional information regarding habitat characterization.

#### *11.3.4.3 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.

### **11.3.5 Botanical Resources**

Comments regarding botanical resources were received from WDFW in response to the DLA regarding specific seeds to be used for revegetation. Other comments related to botanical resources were regarding the purchase of lands for habitat mitigation, as discussed in Section 11.3.4.2. Response to these comments is provided in Appendix L, with relevant changes to the DLA reflected in this FLA.

### **11.3.6 Cultural Resources**

Correspondence and consultation efforts specifically regarding archaeological resources and TCPs include the following:

- CTUIR (to FERC January 1, 2018, Privileged Security Level; email to Applicant November 27, 2018);
- Confederated Tribes and Bands of the Yakama Nation (emails to Applicant February 14, 2018; to FERC February 21, 2019);
- Oregon SHPO (letter to Applicant, December 20, 2018);
- FERC (to Tribes, March 1, 2019; Telephone Memo, June 19, 2019);
- Rye Development made an email request to meet with Yakama Cultural resources (November 7, 2019);

Correspondence received after the DLA filing includes:

- CTUIR (email to Applicant February 10, 2020);
- Confederated Tribes and Bands of the Yakama Nation (letter to FERC, March 11, 2020); and
- Consultation efforts with the Yakama Nation has included conversations between David Warren (Warren Group, LLC) and the Yakama Tribal lobbyist, Dawn Vyvyan (January and May of 2020), and correspondence between Rye Development and the Yakama Nation Archaeologist (Warren Group, LLC Memo).

Copies of all correspondence are located in Appendix F and Appendix H (filed as privileged).

The Umatilla comments on January 2018 were filed with FERC under Privileged Security Level and were not shared with the Applicant. At the time of this filing, the Applicant still has not received a copy of the letter. In their November 2018 email, they indicate that the proposed undertaking is within a historic property of religious and cultural significance to the CTUIR 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 could damage a sacred TCP. The Applicant has formally (November 7, 2019) and informally requested meetings with the Yakama Nation, and although formal meetings have not yet taken place, it is the intent to meet and resolve outstanding issues related to cultural resources.

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, Warm 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.

#### *11.3.6.1 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 FLA) 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 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 continue to collaborate with the Yakama Nation 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.

In a February 2020 email to the Applicant, the CTUIR responded to the DLA. In their letter, they indicate that they consider the Cultural Resources Assessment and Section 106 process for the Project incomplete and that the general area is of religious and cultural significance to the CTUIR. They reiterated that the Cultural Resources Protection Program would like to work with the Applicant and the appropriate representative from FERC, the lead federal agency for the undertaking, to consider resolution of the potential adverse effects to the historic property.

On March 2, 2020, the Applicant responded to CTUIR's email that they would like to set up a meeting(s) to learn more about their concerns, develop a plan for identifying and addressing properties of significance to the CTUIR, and collaborate on appropriate language and measures.

The Yakama Nation provided comments to FERC in a letter dated March 11, 2020 (filed as privileged) detailing their concerns about the proposed Project. They additionally recommend additional cultural surveys to further identify and better delineate properties of cultural significance. The Applicant will continue to work with Yakama representatives to identify how Project impacts may impact significant cultural resources and TCPs within the Project Boundary and the general vicinity. Upcoming surveys performed by Yakama Nation will include evaluating the Columbia Hills MPD TCP under NRHP Criterion B, C, and D per their recommendation in previous surveys. It is the Applicant's intent to resolve outstanding concerns during the FERC Consultation process.

On March 19, 2020, FERC provided detailed comments on the DLA, including cultural resources. They requested that the FLA and final HPMP (Appendix G of the FLA) include the results of National Register eligibility determinations of all cultural sites that cannot be avoided during Project construction, operation, or maintenance activities; this includes evaluation of resources of importance to CTUIR and other tribes in addition to the Yakama Nation.

As outlined in Section 4.0 of this Exhibit E, as well as Appendix G (the HPMP), the Applicant will conduct National Register eligibility determinations for known sites both individually and for their contribution to identified Archaeological Districts. To date, the Applicant has not had access to the CTUIR letter (November 18, 2018), and response to the Applicant's request for more detailed information from CTUIR has not been received. However, the Applicant has requested a meeting with the CTUIR to develop a plan for identifying all historic properties of religious and cultural significant to the CTUIR that are within the Project Boundary. After that forthcoming meeting, the Applicant will submit a schedule for providing a description of the resources, their National Register evaluation, and a description of potential impacts and any proposed mitigation. The Applicant will continue to keep the Confederated Tribes of the Warm Springs Reservation and the Confederated Tribes of the Colville Reservation informed of Project-related cultural resource concerns. Once the additional surveys and meetings have been completed, the draft HPMP (Appendix G) will be finalized.

Consultation efforts with the Yakama Nation has included conversations between David Warren (Warren Group, LLC) and the Yakama Tribal lobbyist, Dawn Vyvyan (January and May of 2020), and correspondence between Rye Development and the Yakama Nation Archaeologist. Summaries of the relevant discussions are included in a memo included in Appendix H. The resulting actions from the discussions include plans for meetings between the Yakama Nation and Rye Development, and details related to future cultural resource evaluations to assess potential Project effects.

The complete comments and Applicant response to these comments is provided in Appendix H (filed as privileged) and Appendix L, with relevant changes reflected in this FLA. Formal consultation on cultural resources will be initiated by FERC as the lead agency, which will culminate in a MOU between FERC and the Applicant. The MOU will be implemented through the HPMP. Potentially impacted Tribes will be consulted at that time for comments regarding the Project and the updated HPMP.

### **11.3.7 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.

Comments on the DLA regarding geology were received from FERC requesting additional information pertaining to the RCRA contaminated site within the Project footprint and characterization of waste disposal from the WSI. Material from the WSI will be tested as approved by Ecology. Response to these comments is provided in Appendix L, with relevant changes to the DLA reflected in this FLA.

### **11.3.8 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.

### **11.3.9 Aesthetic Resources and Land Use**

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

### **11.3.10 Noise**

A comment from FERC was received on the DLA asking for Project noise impacts to be included in the FLA. A discussion on noise impacts can be found in Exhibit E, Section 10.0.

## **11.4 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 Oregon and Washington as listed in FERC's Revised List of Comprehensive Plans, December 2019, in order to explain how and why the

proposed Project will, will 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.

#### **11.4.1 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 and how the Project is consistent with each plan.

##### *11.4.1.1 Oregon*

National Marine Fisheries Service. 2009. Middle Columbia River steelhead distinct population segment Endangered Species Act recovery plan. Portland, Oregon. November 30, 2009. <https://repository.library.noaa.gov/view/noaa/16003>

- The Middle Columbia River steelhead distinct population segment ESA recovery plan is applicable because the proposed Project is located within the habitat of Middle Columbia steelhead distinct population segment.
- As a closed-loop system, the Project will not draw water or release water throughout the life of the Project; therefore, it will not impact the Columbia River or fish species in it. Implementation of the proposed Project, including new environmental measures, management and monitoring plans, and programs, supports management direction, goals, and objectives (e.g., protection of steelhead habitat) contained in the Plan, and therefore is consistent with the plan.

Northwest Power and Conservation Council. 1988. Protected areas amendments and response to comments. Portland, Oregon. Council Document 88-22. September 14, 1988. [https://www.nwcouncil.org/sites/default/files/88\\_22.pdf](https://www.nwcouncil.org/sites/default/files/88_22.pdf)

- The Northwest Power and Conservation Council's 1988 Protected Areas Amendments and Response to Comments is applicable because the proposed Project is located near the Columbia River and is subject to FERC jurisdiction. FERC has a legal obligation to take the Northwest Power and Conservation Council's actions into account in their decision-making.
- The Project will not impact salmon and steelhead spawning and rearing habitat, as no such habitat is present within the Project Boundary. Additionally, as a closed-loop system, the Project will not draw water or release water throughout the life of the Project except for a one-time initial withdrawal from the Columbia River. The Project will mitigate impacted wildlife habitat, as discussed in the WMP (Appendix D). Implementation of the proposed Project, including new environmental measures, management and monitoring plans, and programs, supports management direction, goals, and objectives (e.g., fish and wildlife habitat conservation) contained in the Northwest

Power and Conservation Council's 1988 Protected Areas Amendments and Response, and therefore is consistent with the document.

Oregon Department of Fish and Wildlife. 1982. Comprehensive plan for production and management of Oregon's anadromous salmon and trout: Parts I, II, and III. Portland, Oregon. June 1, 1982. <https://digital.osl.state.or.us/islandora/object/osl:35570>

- The Comprehensive plan for production and management of Oregon's anadromous salmon and trout is applicable because the proposed Project is located within the Columbia River Basin, which is included in the scope of the plan.
- As a closed-loop system, the Project will not draw water or release water throughout the life of the Project; therefore, it will not impact the Columbia River or fish species in it. Implementation of the proposed Project, including new environmental measures, management and monitoring plans, and programs, supports management direction, goals, and objectives (e.g., protection of anadromous salmon and trout) contained in the plan, and therefore is consistent with the plan.

Oregon Department of Fish and Wildlife. 1995. Biennial report on the status of wild fish in Oregon. Portland, Oregon. December 1995. <https://www.dfw.state.or.us/fish/ONFSR/docs/volume-2-final.pdf>

- The more recent 2005 Oregon Native Fish Status Report was reviewed instead of the 1995 version.
- The ODFW report is applicable because the proposed Project is located near the Columbia River, which is evaluated in the report.
- As a closed-loop system, the Project will not draw water or release water throughout the life of the Project; therefore, it will not impact the Columbia River or fish species in it. Implementation of the proposed Project, including new environmental measures, management and monitoring plans, and programs, supports management direction, goals, and objectives (e.g., protection of native fish species) contained in the report, and therefore is consistent with the report.

Oregon Department of Fish and Wildlife. 1996. Species at risk: Sensitive, threatened, and endangered vertebrates of Oregon. Portland, Oregon. June 1996.

- The ODFW report is potentially applicable because the Project is located near the Columbia River, which borders Oregon and Washington State.
- The Project will mitigate impacted wildlife habitat, as discussed in the WMP (Appendix D). Implementation of the proposed Project, including new environmental measures, management and monitoring plans, and programs, supports management direction, goals, and objectives (e.g., fish and wildlife conservation) contained in Species at risk: Sensitive, threatened, and endangered vertebrates of Oregon, and therefore is consistent with the report.

Oregon State Game Commission. 1963–1975. Fish and wildlife resources—18 basins. Portland, Oregon. 21 reports.

- Fish and wildlife resources—18 basins is potentially applicable because the proposed Project is located within the Columbia River Basin and borders the Columbia River, which runs between Oregon and Washington State.
- As a closed-loop system, the Project will not draw water or release water throughout the life of the Project; therefore, it will not impact the Columbia River or fish species in it. The Project will mitigate impacted wildlife habitat, as discussed in the WMP (Appendix D). Implementation of the proposed Project, including new environmental measures, management and monitoring plans, and programs, supports management direction, goals, and objectives (e.g., fish and wildlife management) contained in Fish and wildlife resources—18 basins, and therefore is consistent with the report.

Oregon State Parks and Recreation Department. Outdoor Recreation Plan (SCORP): 2003–2007. Salem, Oregon. January 2003. <https://www.oregon.gov/oprd/PRP/Documents/SCORP-2019-2023-Final.pdf>

- The current (2019) Oregon Statewide Comprehensive Outdoor Recreation Plan (SCORP) was reviewed instead of the 2003 version.
- The SCORP is potentially applicable to the proposed Project because the Project is located adjacent to Oregon.
- The Project will not have impacts on recreation resources, as no recreation sites exist within the Project area. Implementation of the proposed Project, including new environmental measures, management and monitoring plans, and programs, supports management direction, goals, and objectives (e.g., recreation conservation) contained in the SCORP, and therefore is consistent with the SCORP.

Oregon State Parks and Recreation Division. 1987. Recreational Values on Oregon Rivers. Salem, Oregon. April 1987.

- This document is potentially applicable because the proposed Project is located near the Columbia River, which runs between Washington State and Oregon State.
- The Project will not have impacts on recreation resources, as no recreation sites exist within the Project area. Implementation of the proposed Project, including new environmental measures, management and monitoring plans, and programs, supports management direction, goals, and objectives (e.g., recreation conservation) contained in Recreational Values on Oregon Rivers, and is therefore consistent with the study.

State of Idaho. State of Oregon. State of Washington. Confederated Tribes of the Warm Springs Reservation of Oregon. CTUIR. 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. <https://usace.contentdm.oclc.org/digital/collection/p16021coll3/id/420/>

- The Columbia River fish management plan is potentially applicable because the proposed Project is located near the Columbia River, which runs between Washington State and Oregon State, and the proposed Project will use water from the Columbia River.
- The Project will not impact fisheries or fish habitat, as the Project is a closed-loop system and will not draw water or release water throughout the life of the Project except for a one-time initial withdrawal from the Columbia River. Implementation of the proposed Project, including new environmental measures, management and monitoring plans, and programs, supports management direction, goals, and objectives (e.g., fisheries conservation) contained in 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, CTUIR, Nez Perce Tribe, and Confederated Tribes and Bands of the Yakama Indian Nation, and therefore is consistent with the plan.

National Park Service. The Nationwide Rivers Inventory. Department of the Interior, Washington, D.C. 1993. <https://www.nps.gov/subjects/rivers/nationwide-rivers-inventory.htm>

- The current (2017) digital version of the Nationwide Rivers Inventory was reviewed instead of the 1993 version.
- The Nationwide Rivers Inventory is potentially applicable to the proposed Project because it is located adjacent to and over waters of Oregon (the Columbia River).
- As a closed-loop system, the Project will not draw water or release water throughout the life of the Project. Implementation of the proposed Project, including new environmental measures, management and monitoring plans, and programs, supports management direction, goals, and objectives (e.g., avoidance of affects to National River Inventory segments) contained in the National Rivers Inventory, and therefore is consistent with the National Rivers Inventory.

Department of the Army, Corps of Engineers. Portland District. 1993. Water resources development in Oregon. Portland, Oregon. <https://www.oregon.gov/OWRD/programs/FundingOpportunities/Pages/default.aspx>

- The current (2020) Oregon Water Resource Development website was reviewed instead of the 1993 report.
- Water resources development in Oregon is potentially applicable to the proposed Project because it is located adjacent to and over waters of Oregon (the Columbia River).
- As a closed-loop system, the Project will not draw water or release water throughout the life of the Project. Implementation of the proposed Project, including new environmental measures, management and monitoring plans, and programs, supports management direction, goals, and objectives (e.g., water resource management) contained in Water resources development in Oregon, and therefore is consistent with the program.

Hydro Task Force and Strategic Water Management Group. 1988. Oregon comprehensive waterway management plan. Salem, Oregon.

- The Oregon comprehensive waterway management plan is potentially applicable to the proposed Project because it is located adjacent to and over waters of Oregon (the Columbia River) and will use water from the river.
- As a closed-loop system, the Project will not draw water or release water throughout the life of the Project. Implementation of the proposed Project, including new environmental measures, management and monitoring plans, and programs, supports management direction, goals, and objectives (e.g., waterway management) contained in the Oregon comprehensive waterway management plan, and therefore is consistent with the plan.

Northwest Power and Conservation Council. 2014. Columbia River Basin Fish and Wildlife Program. Portland, Oregon. Council Document 2014-12. October 2014.

[https://www.nwcouncil.org/sites/default/files/2014-12\\_1.pdf](https://www.nwcouncil.org/sites/default/files/2014-12_1.pdf)

- The Northwest Power and Conservation Council 2014 Columbia River Basin Fish and Wildlife Program is applicable because the proposed Project is located within the Columbia River Basin near the Columbia River and John Day Dam, and because the proposed Project is subject to FERC jurisdiction. FERC has a legal obligation to take the Northwest Power and Conservation Council's actions into account in their decision-making.
- The Project will not impact fisheries or fish habitat, as the Project is a closed-loop system and will not draw water or release water throughout the life of the Project except for a one-time initial withdrawal from the Columbia River. The Project will mitigate impacted wildlife habitat, as discussed in the WMP (Appendix D). Implementation of the proposed Project, including new environmental measures, management and monitoring plans, and programs, supports management direction, goals, and objectives (e.g., fish and wildlife conservation) contained in the Columbia River Basin Fish and Wildlife Program, and therefore is consistent with the program.

Northwest Power and Conservation Council. 2016. The Seventh Northwest Conservation and Electric Power Plan. Portland, Oregon. Council Document 2016-02. February 2016.

<https://www.nwcouncil.org/reports/seventh-power-plan>

- The Seventh Northwest Conservation and Electric Power Plan is applicable because the proposed Project is located near the Columbia River and the John Day Hydroelectric Dam.
- Implementation of the proposed Project supports local power production goals contained in the Seventh Northwest Conservation and Electric Power Plan, and therefore is consistent with the Plan.

Oregon Department of Energy. 1987. Oregon final summary report for the Pacific Northwest rivers study. Salem, Oregon. November 1987.

- The Oregon final summary report for the Pacific Northwest rivers study is potentially applicable to the proposed Project because it is located adjacent to and over the Columbia River.
- As a closed-loop system, the Project will not draw water or release water throughout the life of the Project. Implementation of the proposed Project, including new environmental measures, management and monitoring plans, and programs, supports management direction, goals, and objectives (e.g., waterway management) contained in the Oregon final summary report for the Pacific Northwest rivers study, and therefore is consistent with the study.

Oregon Department of Environmental Quality. 1978. Statewide water quality management plan. Salem, Oregon. November 1978. Seven volumes.

<https://www.oregon.gov/deq/FilterDocs/WQdivPlan2020.pdf>

- The current (2020) Water Quality Program Plan was reviewed instead of the 1978 version.
- The Statewide water quality management plan is potentially applicable to the proposed Project because it is located adjacent to and over the Columbia River.
- As a closed-loop system, the Project will not draw water or release water throughout the life of the Project. Implementation of the proposed Project, including new environmental measures, management and monitoring plans, and programs, supports management direction, goals, and objectives (e.g., maintaining water quality) contained in the Oregon Water Quality Program Plan, and therefore is consistent with the Plan.

Oregon Water Resources Board. 1973. Surface area of lakes and reservoirs. Salem, Oregon.

<https://digital.osl.state.or.us/islandora/object/osl%3A558581>

- The Surface area of lakes and reservoirs is potentially applicable to the proposed Project because it is located adjacent to and over the Columbia River and the John Day Dam and Reservoir.
- As a closed-loop system, the Project will not draw water or release water throughout the life of the Project. Implementation of the proposed Project, including new environmental measures, management and monitoring plans, and programs, supports management direction, goals, and objectives (e.g., listing lakes and reservoirs) contained in the Surface area of lakes and reservoirs, and therefore is consistent with the Surface area of lakes and reservoirs.

Oregon Water Resources Commission. 1987. State of Oregon water use programs. Salem, Oregon.

- The State of Oregon water use programs is potentially applicable to the proposed Project because it is located adjacent to and over the Columbia River, and will use water from the river.

- As a closed-loop system, the Project will not draw water or release water throughout the life of the Project. Implementation of the proposed Project, including new environmental measures, management and monitoring plans, and programs, supports management direction, goals, and objectives (e.g., water resource management) contained in the State of Oregon water use programs, and therefore is consistent with the programs.

Oregon Water Resources Department. 1988. Oregon water laws. Salem, Oregon.

Oregon Water Resources Department. Salem, Oregon. 2017. Oregon's 2017 Integrated Water Resources Strategy.

#### *11.4.1.2 Washington*

Interagency Committee for Outdoor Recreation. Washington State Comprehensive Outdoor Recreation Planning Document (SCORP): 2002-2007. Olympia, Washington. October 2002. <https://rco.wa.gov/wp-content/uploads/2019/07/RCO-SCORP-ExecSummary-2018.pdf>

- The Washington SCORP is potentially applicable to the proposed Project because the Project is located within Washington State.
- The Project will not have impacts on recreation resources, as no recreation sites exist within the Project area. Implementation of the proposed Project, including new environmental measures, management and monitoring plans, and programs, supports management direction, goals, and objectives (e.g., recreation conservation) contained in the SCORP, and therefore is consistent with the SCORP.

Interagency Committee for Outdoor Recreation. 1995. Washington State outdoor recreation and habitat: Assessment and policy plan 1995–2001. Tumwater, Washington. November 1995.

- The Washington SCORP is potentially applicable to the proposed Project because the Project is located within Washington State.
- The Project will not have impacts on recreation resources, as no recreation sites exist within the Project area. Implementation of the proposed Project, including new environmental measures, management and monitoring plans, and programs, supports management direction, goals, and objectives (e.g., recreation conservation) contained in the SCORP, and therefore is consistent with the SCORP.

Interagency Committee for Outdoor Recreation. 1991. Washington State trails plan: policy and action document. Tumwater, Washington. June 1991.

- The Washington State Trails Plan: Policy and Action Document is potentially applicable to the proposed Project because the Project is located within Washington State.
- The Project will not have impacts on state recreational trail resources, as no recreational trails exist within the Project area. Implementation of the proposed Project, including new environmental measures, management and monitoring plans, and programs, supports management direction, goals, and objectives (e.g., state trail conservation) contained in

the Washington State Trails Plan: Policy and Action Document set forth by the Interagency Committee for Outdoor Recreation, and therefore is consistent with the plan.

National Marine Fisheries Service. 2009. Middle Columbia River steelhead distinct population segment Endangered Species Act recovery plan. Portland, Oregon. November 30, 2009.

- This plan is discussed above in the Oregon section.

National Park Service. 1993. The Nationwide Rivers Inventory. Department of the Interior, Washington, D.C. 1993.

- This plan is discussed above in the Oregon section.

Northwest Power and Conservation Council. 1988. Protected areas amendments and response to comments. Portland, Oregon. Council Document 88-22. September 14, 1988.

- This plan is discussed above in the Oregon section.

U.S. Fish and Wildlife Service. 2013. Greater Sage-grouse (*Centrocercus urophasianus*) Conservation Objectives: Final Report. Denver, Colorado. February 2013. <https://www.fws.gov/greatersagegrouse/documents/COT-Report-with-Dear-Interested-Reader-Letter.pdf>

- The USFWS 2013 Greater Sage-grouse (*Centrocercus urophasianus*) Conservation Objectives: Final Report is potentially applicable because the Project is located within Sage Grouse Management Zone IV.
- The Project will mitigate impacted wildlife habitat, as discussed in the WMP (Appendix D). Implementation of the proposed Project, including new environmental measures, management and monitoring plans, and programs, supports management direction, goals, and objectives (e.g., wildlife conservation) contained in The 2013 Greater Sage-grouse (*Centrocercus urophasianus*) Conservation Objectives: Final Report set forth by the USFWS, and therefore is consistent with the report.

U.S. Fish and Wildlife Service. n.d. Fisheries USA: the recreational fisheries policy of the U.S. Fish and Wildlife Service. Washington, D.C U.S. Fish and Wildlife Service. Canadian Wildlife Service. 1986. North American waterfowl management plan. Department of the Interior. Environment Canada. May 1986. <https://nawmp.org/sites/default/files/2018-01/1986%20OriginalNAWMP.pdf>

- The USFWS 1986 North American Waterfowl Management Plan is potentially applicable because the Project is located near the Columbia River, which provides habitat for waterfowl.
- The Project will not destroy or degrade waterfowl habitat. The Project will mitigate impacted wildlife habitat, as discussed in the WMP (Appendix D). Implementation of the proposed Project, including new environmental measures, management and monitoring plans, and programs, supports management direction, goals, and objectives (e.g., waterfowl conservation) contained in the 1986 North American Waterfowl Management Plan set forth by the USFWS, and therefore is consistent with the plan.

Washington Department of Ecology. 1994. State wetlands integration strategy. Olympia, Washington. December 1994.

<https://fortress.wa.gov/ecy/publications/documents/95100.pdf>

- The Washington Department of Ecology 1994 State Wetlands Integration Strategy is potentially applicable because there are wetland features located within the Project area.
- The Project will avoid impacts to wetlands to the extent practicable. Any unavoidable impacts to wetlands will be minimized through the implementation of BMPs, and mitigation will be provided if necessary, as discussed in Exhibit E. Implementation of the proposed Project, including new environmental measures, management and monitoring plans, and programs, supports management direction, goals, and objectives (e.g., wetland impact avoidance) contained in the Washington Department of Ecology 1994 State Wetlands Integration Strategy and therefore is consistent with the strategy document.

Bureau of Land Management. 1987. Spokane resource area management plan. Department of the Interior, Spokane, Washington. May 1987. [https://eplanning.blm.gov/epl-front-office/projects/lup/36351/78136/88065/RMP\\_ROD\\_1987\\_fromWEB.pdf](https://eplanning.blm.gov/epl-front-office/projects/lup/36351/78136/88065/RMP_ROD_1987_fromWEB.pdf)

- The BLM 1987 Spokane Resource Area Management Plan is potentially applicable because the proposed Project is located within the Spokane resource area.
- The Project will not impact BLM land or other public land, as it is not located on public land; it is sited on private land owned by NSC Smelter, LLC. Implementation of the proposed Project, including new environmental measures, management and monitoring plans, and programs, supports management direction, goals, and objectives (e.g., public land management and conservation) contained in the Spokane resource area management plan set forth by the BLM, and therefore is consistent with the plan.

National Marine Fisheries Service. 2004. Lower Columbia Salmon Recovery and Fish & Wildlife Subbasin Plan. Washington. December 15, 2004.

[https://www.nwcouncil.org/sites/default/files/Vol\\_II\\_A\\_\\_Col\\_Estuary\\_mainstem.pdf](https://www.nwcouncil.org/sites/default/files/Vol_II_A__Col_Estuary_mainstem.pdf)

- The NMFS 2004 Lower Columbia Salmon Recovery and Fish & Wildlife Subbasin Plan is potentially applicable because the proposed Project is located in the Lower Middle Columbia River Subbasin, near the Columbia River and the John Day Dam.
- The Project will not impact salmon or their habitat, as the Project is a closed-loop system and will not draw water or release water throughout the life of the Project except for a one-time initial withdrawal from the Columbia River. The Project will mitigate impacted wildlife habitat, as discussed in the WMP (Appendix D). Implementation of the proposed Project, including new environmental measures, management and monitoring plans, and programs, supports management direction, goals, and objectives (e.g., fish and wildlife conservation) contained in the Lower Columbia Salmon Recovery and Fish & Wildlife Subbasin Plan set forth by the NMFS, and therefore is consistent with the plan.

Northwest Power and Conservation Council. 2014. Columbia River Basin Fish and Wildlife Program. Portland, Oregon. Council Document 2014-12.

- This plan is discussed above in the Oregon section.

Northwest Power and Conservation Council. 2016. The Seventh Northwest Conservation and Electric Power Plan. Portland, Oregon. Council Document 2016-02. February 2016. <https://www.nwcouncil.org/reports/seventh-power-plan>

- The Northwest Power and Conservation Council 2016 Seventh Northwest Conservation and Electric Power Plan is applicable because the proposed Project is an addition to the John Day Hydroelectric Dam system, is located near the Columbia River and John Day Dam, and is subject to FERC jurisdiction. FERC has a legal obligation to take the Northwest Power and Conservation Council's actions into account in their decision-making.
- Implementation of the proposed Project, including new environmental measures, management and monitoring plans, and programs, supports management direction, goals, and objectives (e.g., meeting regional electricity needs) contained in the Seventh Northwest Conservation and Electric Power Plan, and therefore is consistent with the plan.

State of Idaho. State of Oregon. State of Washington. Confederated Tribes of the Warm Springs Reservation of Oregon. CTUIR. 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.

- This plan is discussed above in the Oregon section.

State of Washington. 1977. Statute establishing the State scenic river system, Chapter 79.72 RCW. Olympia, Washington.

- The State of Washington 1977 statute establishing the State scenic river system is 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.
- As a closed-loop system, the Project will not draw water or release water throughout the life of the Project except for a one-time initial withdrawal from the Columbia River. Implementation of the proposed Project, including new environmental measures, management and monitoring plans, and programs, supports management direction, goals, and objectives (e.g., preservation of the Columbia River) contained in the 1977 statute establishing the state scenic river system in Washington State, and therefore is consistent with the statute.

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.

- The Washington Department of Community Development 1987 Resource Protection Planning Process Identification of Prehistoric Archaeological Resources in the Lower Columbia Study Unit is potentially applicable because the proposed Project is located in the Lower Middle Columbia Basin near the Columbia River in Washington State.

- As described in Exhibit E, Section 4.0, appropriate avoidance measures for cultural resources identified within the Project Boundary will be implemented pursuant to the Project's HPMP (Appendix G). Implementation of the proposed Project, including new environmental measures, management and monitoring plans, and programs, supports management direction, goals, and objectives (e.g., preservation of archaeological resources) contained in 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, and therefore is consistent with this process.

Washington Department of Community Development. Office of Archaeology and Historic Preservation. 1987. Resource protection planning process—Paleoindian study unit. Olympia, Washington.

- The Washington Department of Community Development 1987 Resource Protection Planning Process—Paleoindian Study Unit is potentially applicable because the proposed Project is located in the Lower Middle Columbia Basin near the Columbia River in Washington State.
- As described in Exhibit E, Section 4.0, appropriate avoidance measures for cultural resources identified within the Project Boundary will be implemented pursuant to the Project's HPMP (Appendix G). Implementation of the proposed Project, including new environmental measures, management and monitoring plans, and programs, supports management direction, goals, and objectives (e.g., preservation of archaeological resources) contained in the Resource Protection Planning Process—Paleoindian Study Unit set forth by the Washington Department of Community Development and Office of Archaeology and Historic Preservation, and therefore is consistent with this process.

Washington Department of Community Development. Office of Archaeology and Historic Preservation. 1987. Resource protection planning process—mid-Columbia study unit. Olympia, Washington.

- The Washington Department of Community Development 1987 Resource Protection Planning Process—Mid-Columbia Study Unit is potentially applicable because the proposed Project is located in the Lower Middle Columbia Basin near the Columbia River in Washington State.
- As described in Exhibit E, Section 4.0, appropriate avoidance measures for cultural resources identified within the Project Boundary will be implemented pursuant to the Project's HPMP (Appendix G). Implementation of the proposed Project, including new environmental measures, management and monitoring plans, and programs, supports management direction, goals, and objectives (e.g., preservation of archaeological resources) contained in the Resource Protection Planning Process—Mid-Columbia Study Unit set forth by the Washington Department of Community Development and Office of Archaeology and Historic Preservation, and therefore is consistent with this process.

Washington State Department of Ecology. 1978. Water resources management program: Columbia River John Day and McNary pools. Olympia, Washington. October 1978. <https://fortress.wa.gov/ecy/publications/documents/7811001.pdf>

- The Washington State Department of Ecology 1978 Water Resources Management Program: Columbia River John Day and McNary Pools is 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.
- As a closed-loop system, the Project will not draw water or release water throughout the life of the Project except for a one-time initial withdrawal from the Columbia River. Implementation of the proposed Project, including new environmental measures, management and monitoring plans, and programs, supports management direction, goals, and objectives (e.g., water resource management) contained in the 1978 Water Resources Management Program: Columbia River John Day and McNary Pools set forth by the Washington State Department of Ecology, and therefore is consistent with the program.

Washington State Department of Ecology. 1986. Application of shoreline management to hydroelectric developments. Olympia, Washington. September 1986.

- The Washington State Department of Ecology 1986 Application of Shoreline Management to Hydroelectric Developments is potentially applicable because the proposed Project is located near the shoreline of the Columbia River in Washington State and is an addition to the current John Day Hydroelectric Dam system.
- The proposed Project will not impact the shoreline as no ground disturbing activities will take place in shoreline habitat. Implementation of the proposed Project, including new environmental measures, management and monitoring plans, and programs, supports management direction, goals, and objectives (e.g., shoreline management) contained in the 1986 Application of Shoreline Management to Hydroelectric Developments set forth by the Washington State Department of Ecology, and therefore is consistent with the management guidance.

Washington State Department of Ecology. 1982. Instream resource protection program for the main stem Columbia River in Washington State. Olympia, Washington.  
<https://fortress.wa.gov/ecy/publications/documents/8011004.pdf>

- The Washington State Department of Ecology 1982 Instream Resource Protection Program for the Main Stem Columbia River in Washington State is applicable because the proposed Project is located near the Columbia River in Washington State and will withdraw water from the river.
- As a closed-loop system, the Project will not draw water or release water throughout the life of the Project except for a one-time initial withdrawal from the Columbia River. Implementation of the proposed Project, including new environmental measures, management and monitoring plans, and programs, supports management direction, goals, and objectives (e.g., Columbia River water resource management) contained in the 1982 Instream Resource Protection Program for the Main Stem Columbia River in Washington State set forth by the Washington State Department of Ecology, and therefore is consistent with the program.

Washington Department of Fisheries. 1987. Hydroelectric Project assessment guidelines. Olympia, Washington.

- The Washington Department of Fisheries 1987 Hydroelectric Project Assessment Guidelines is applicable because the proposed Project is located near the Columbia River in Washington State and is an addition to the current John Day Hydroelectric Dam system.
- Implementation of the proposed Project, including new environmental measures, management and monitoring plans, and programs, supports management direction, goals, and objectives (e.g., hydroelectric development) contained in the 1987 Hydroelectric Project Assessment Guidelines set forth by the Department of Fisheries, and therefore is consistent with the guidelines.

Washington Department of Fish and Wildlife. 1997. Management recommendations for Washington's priority habitats: Riparian. Olympia, Washington. December 1997. <https://wdfw.wa.gov/sites/default/files/publications/00029/wdfw00029.pdf>

- The WDFW 1997 Management Recommendations for Washington's Priority Habitats: Riparian is potentially applicable because the Project is located near the Columbia River.
- The proposed Project will not impact riparian habitat as there is no riparian habitat located within the Project footprint. Implementation of the proposed Project, including new environmental measures, management and monitoring plans, and programs, supports management direction, goals, and objectives (e.g., riparian habitat conservation) contained in the 1997 Management Recommendations for Washington's Priority Habitats: Riparian set forth by the WDFW, and therefore is consistent with the management guidance.

Washington Department of Fish and Wildlife. 2004. Management recommendations for Washington's priority species, Volume IV: Birds. Olympia, Washington. May 2004. <https://wdfw.wa.gov/sites/default/files/publications/00026/wdfw00026.pdf>

- The WDFW 2004 Management Recommendations for Washington's Priority Species, Volume IV: Birds is applicable because the Project is located in Washington State and within habitat for several bird species.
- The Project will mitigate impacted wildlife habitat, as discussed in the WMP (Appendix D). Implementation of the proposed Project, including new environmental measures, management and monitoring plans, and programs, supports management direction, goals, and objectives (e.g., bird conservation) contained in the 2004 Management Recommendations for Washington's Priority Species, Volume IV: Birds set forth by the WDFW, and therefore is consistent with the management guidance.

Washington Department of Fish and Wildlife. 2005. Washington's comprehensive wildlife conservation strategy. Olympia, Washington. September 19, 2005. <https://wdfw.wa.gov/publications/00727>

- The WDFW 2005 Washington's Comprehensive Wildlife Conservation Strategy is applicable because the Project is located in Washington State and within habitat for several wildlife species.
- The Project will mitigate impacted wildlife habitat, as discussed in the WMP (Appendix D). Implementation of the proposed Project, including new environmental measures, management and monitoring plans, and programs, supports management direction, goals, and objectives (e.g., wildlife conservation) contained in the 2005 Washington's Comprehensive Wildlife Conservation Strategy set forth by the WDFW, and therefore is consistent with the management guidance.

Washington Department of Game. 1987. Strategies for Washington's wildlife. Olympia, Washington. May 1987.

- The Washington Department of Game 1987 Strategies for Washington's Wildlife is applicable because the Project is located in Washington State and within habitat for several wildlife species.
- The Project will mitigate impacted wildlife habitat, as discussed in the WMP (Appendix D). Implementation of the proposed Project, including new environmental measures, management and monitoring plans, and programs, supports management direction, goals, and objectives (e.g., wildlife conservation) contained in 1987 Strategies for Washington's Wildlife set forth by the Washington Department of Game, and therefore is consistent with the management guidance.

Washington Department of Natural Resources. 1987. State of Washington natural heritage plan. Olympia, Washington.

- The Washington DNR 1987 State of Washington Natural Heritage Plan is applicable because the Project is located in Washington State.
- The Project will mitigate impacted wildlife habitat, as discussed in the WMP (Appendix D), and will avoid or mitigate impacts to special status plant species. Implementation of the proposed Project, including new environmental measures, management and monitoring plans, and programs, supports management direction, goals, and objectives (e.g., native species conservation) contained in the 1987 State of Washington Natural Heritage Plan set forth by the Washington DNR, and therefore is consistent with the plan.

Washington Department of Natural Resources. 1997. Final habitat conservation plan. Olympia, Washington. September 1997.

[https://www.dnr.wa.gov/publications/lm\\_hcp\\_plan\\_1997.pdf?13kyqk](https://www.dnr.wa.gov/publications/lm_hcp_plan_1997.pdf?13kyqk)

- The Washington DNR 1997 Final Habitat Conservation Plan is applicable because the proposed Project is located within the Klickitat County, which is included in the Final Habitat Conservation Plan.
- The Project will mitigate impacted wildlife habitat, as discussed in the WMP (Appendix D), and will avoid or mitigate impacts to special status plant species. Implementation of the proposed Project, including new environmental measures,

management and monitoring plans, and programs, supports management direction, goals, and objectives (e.g., habitat conservation) contained in 1997 Final Habitat Conservation Plan set forth by the Washington DNR, and therefore is consistent with the plan.

Washington State Energy Office. 1992. Washington State hydropower development/resource protection plan. Olympia, Washington. December 1992.

<https://fortress.wa.gov/ecy/publications/documents/92016a.pdf>

- The Washington State Energy Office 1992 Washington State Hydropower Development/Resource Protection Plan is applicable because the proposed Project is located near the John Day Hydroelectric Dam on the Columbia River.
- Implementation of the proposed Project, including new environmental measures, management and monitoring plans, and programs, supports management direction, goals, and objectives (e.g., hydroelectric development) contained in the 1992 Washington State Hydropower Development/Resource Protection Plan set forth by the Washington State Energy Office, and is therefore consistent with the plan.

Washington State Parks and Recreation Commission. 1988. Washington State scenic river assessment. Olympia, Washington. September 1988.

<https://www.co.mason.wa.us/health/environmental/WRIA/selected-references/1988%20WA%20State%20Scenic%20River%20Assessment.pdf>

- The Washington State Parks and Recreation Commission 1988 Washington State Scenic Rivers Assessment is 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.
- As a closed-loop system, the Project will not draw water or release water throughout the life of the Project except for a one-time initial withdrawal from the Columbia River. Implementation of the proposed Project, including new environmental measures, management and monitoring plans, and programs, supports management direction, goals, and objectives (e.g., preservation of the Columbia River) contained in the 1988 Washington State Scenic River Assessment set forth by the Washington State Parks and Recreation Commission, and therefore is consistent with the assessment.

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

- The Washington State Parks and Recreation Commission 1988 Scenic Rivers Program: Report is 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.
- As a closed-loop system, the Project will not draw water or release water throughout the life of the Project except for a one-time initial withdrawal from the Columbia River. Implementation of the proposed Project, including new environmental measures, management and monitoring plans, and programs, supports management direction, goals,

and objectives (e.g., preservation of the Columbia River) contained in the 1988 Washington State Scenic Rivers Program: Report set forth by the Washington State Parks and Recreation Commission, and therefore is consistent with the program.

Washington State Recreation and Conservation Office. 2013. Outdoor Recreation in Washington, the 2013 State Comprehensive Outdoor Recreation Plan.

#### **11.4.2 Qualifying comprehensive Plans Deemed Not Applicable**

The Oregon and Washington qualifying plans from the FERC list below were deemed to be not applicable to the Project because they are for resources outside of the Project Boundary.

##### *11.4.2.1 Oregon*

Bureau of Land Management. 1985. A five-year comprehensive anadromous fish habitat enhancement plan for Oregon coastal rivers. Department of the Interior, Portland, Oregon. May 1985.

Bureau of Land Management. 1986. Two Rivers resource area management plan. Department of the Interior, Prineville, Oregon. June 1986.

Bureau of Land Management. 1987. Spokane resource area management plan. Department of the Interior, Spokane, Washington. May 1987.

Bureau of Land Management. 1989. Baker resource management plan. Department of the Interior, Baker, Oregon. July 1989.

Bureau of Land Management. 1989. Brothers/LaPine resource management plan. Department of the Interior, Prineville, Oregon. July 1989.

Bureau of Land Management. 1990. Final eligibility and suitability report for the Upper Klamath Wild and Scenic River study. Department of the Interior, Klamath Falls, Oregon. March 1990.

Bureau of Land Management. 1990. Issues and alternatives for management of the lower Deschutes River. Department of the Interior, Prineville, Oregon. January 1990.

Bureau of Land Management. 1990. Resource assessment of the Grande Ronde River. Department of the Interior, Baker, Oregon. August 1990.

Bureau of Land Management. 1990. Resource assessment of the Powder River. Department of the Interior, Baker, Oregon. August 1990.

Bureau of Land Management. 1992. Quartzville Creek National Wild and Scenic River management plan. Department of the Interior, Salem, Oregon. November 1992.

Bureau of Land Management. 1992. South Fork of the Walla Walla River area plan amendment. Department of the Interior, Vale, Oregon. August 1992.

Bureau of Land Management. 1992. Three Rivers resource management plan. Department of the Interior, Hines, Oregon. September 1992.

- Bureau of Land Management. 1993. Donner and Blitzen National Wild and Scenic River management plan. Department of the Interior, Hines, Oregon. May 1993.
- Bureau of Land Management. 1993. Lower Deschutes River management plan. Department of the Interior, Prineville, Oregon.
- Bureau of Land Management. 1993. Main, West Little, and North Fork Owyhee National Wild and Scenic Rivers management plan. Department of the Interior, Vale, Oregon. September 1993.
- Bureau of Land Management. 1993. North Fork Malheur River final eligibility study report for the National Wild and Scenic Rivers System. Department of the Interior, Vale, Oregon. September 1993.
- Bureau of Land Management. 1993. Wallowa & Grande Ronde Rivers final management plan. Department of the Interior, Baker City, Oregon. December 1993. Chapters 1-3.
- Bureau of Land Management. 1994. Powder River Final Management Plan/Environmental Assessment. Baker City, Oregon. April 1994.
- Bureau of Land Management. 1996. High desert management framework proposed plan amendment and final environmental impact statement for the Lake Albert area of critical environmental concern. Department of the Interior, Lakeview, Oregon. February 1996.
- Bureau of Land Management. 1996. Upper Klamath Basin and Wood River wetland resource management plan. Department of the Interior, Klamath Falls, Oregon. February 1996.
- Bureau of Land Management. 2000. Rogue National Wild and Scenic River: Hellgate Recreation Area management plan. November 2000.
- Bureau of Land Management. 2001. John Day River management plan, Two Rivers, John Day, and Baker resource management plan. February 2001.
- Bureau of Land Management. 2002. Southeastern Oregon Resource Management Plan and Record of Decision. Vale, Oregon. September 2002.
- Bureau of Land Management. 2003. Lakeview Resource Management Plan and Record of Decision. Lakeview, Oregon. November 2003.
- Bureau of Land Management. 2005. Andrews Management Unit Record of Decision and Resource Management Plan. Burns, Oregon. August 2005.
- Bureau of Land Management. 2005. Steens Mountain Cooperative Management and Protection Area Record of Decision and Resource Management Plan. Burns, Oregon. August 2005.
- Bureau of Land Management. 2005. Steens Mountain Wilderness and Wild and Scenic Rivers Plan – Appendix P. Burns, Oregon. August 2005.
- Bureau of Land Management. 2005. Upper Deschutes Record of Decision and Resource Management Plan. Prineville, Oregon. September 2005.

Bureau of Land Management. 2008. Cascade-Siskiyou National Monument Record of Decision and Resource Management Plan. Medford, Oregon. August 2008.

Bureau of Land Management. 2008. Cascade-Siskiyou National Monument Resource Management Plan Amendment and Associated Environmental Assessment. Medford, Oregon. August 2008.

Bureau of Land Management. 2015. John Day Basin Record of Decision and Resource Management Plan. Prineville, Oregon. June 2015.

Bureau of Land Management. 2015. Oregon Greater Sage-Grouse Approved Resource Management Plan Amendment—Attachment 3. Portland, Oregon. September 2015.

Bureau of Land Management. 2015. Record of Decision and Approved Resource Management Plan for the Great Basin Region, Including the Greater Sage Grouse Sub-Regions of Idaho and Southwestern Montana, Nevada and Northeastern California, Oregon, and Utah. Washington, D.C. September 2015.

Bureau of Land Management. 2016. Recreation Management Area Frameworks for the Klamath Falls Field Office of the Lakeview District. Klamath Falls, Oregon. July 2016.

Bureau of Land Management. 2016. Southwestern Oregon Record of Decision and Resource Management Plan. Portland, Oregon. August 2016.

Bureau of Land Management. Bureau of Indian Affairs. Confederated Tribes of the Warm Springs Reservation. State of Oregon. 1997. Supplement to the Lower Deschutes River Management Plan Final Decision—Lower Deschutes River Allocation System. June 1997.

Bureau of Land Management. Bureau of Reclamation. 1992. Lower Crooked Wild and Scenic River (Chimney Rock segment) management plan. Department of the Interior, Prineville, Oregon. October 1992.

Bureau of Land Management. Forest Service. 1993. North Fork Crooked River management plan. Department of the Interior, Prineville, Oregon. Department of Agriculture, Ochoco National Forest. April 1993.

Bureau of Land Management. Forest Service. 1994. Standards and guidelines for management of habitat for late-successional and old-growth forest related species within the range of the northern spotted owl. Washington, D.C. April 13, 1994.

Bureau of Land Management. Forest Service. 1996. Status of the Interior Columbia Basin: Summary of scientific findings. Portland, Oregon. November 1996.

Bureau of Land Management. Forest Service. Oregon State Parks and Recreation Department. 1992. Middle Deschutes/Lower Crooked Wild and Scenic Rivers management plan. Department of the Interior, Prineville, Oregon. Department of Agriculture, Ochoco National Forest. December 1992.

Bureau of Land Management. Forest Service. Oregon State Parks and Recreation Department. 1992. North Umpqua River management plan. July 1992.

- Bureau of Land Management. Oregon State Parks and Recreation Department. Clackamas and Multnomah Counties. 1993. Sandy Wild and Scenic River and state scenic waterway management plan. Salem, Oregon. September 1993.
- Forest Service. 1989. Ochoco National Forest and Crooked River National Grassland Plan. Department of Agriculture, Bend, Oregon. October 1989.
- Forest Service. 1990. Deschutes National Forest land and resource management plan. Department of Agriculture, Bend, Oregon. August 1990.
- Forest Service. 1990. Malheur National Forest land and resource management plan. Department of Agriculture, John Day, Oregon. May 1990.
- Forest Service. 1990. Mt. Hood National Forest land and resource management plan. Department of Agriculture, Gresham, Oregon. October 1990.
- Forest Service. 1990. Rogue River National Forest land and resource management plan. Department of Agriculture, Medford, Oregon. July 1990.
- Forest Service. 1990. Siuslaw National Forest land and resource management plan. Department of Agriculture, Corvallis, Oregon.
- Forest Service. 1990. Umpqua National Forest land and resource management plan. Department of Agriculture, Roseburg, Oregon. September 1990.
- Forest Service. 1990. Wallowa-Whitman National Forest land and resource management plan. Department of Agriculture, Baker City, Oregon. April 1990.
- Forest Service. 1990. Willamette National Forest land and resource management plan. Department of Agriculture, Eugene, Oregon. July 1990.
- Forest Service. 1990. Winema National Forest land and resource management plan. Department of Agriculture, Klamath Falls, Oregon. September 1990.
- Forest Service. 1993. Clackamas National Wild and Scenic River and State Scenic Waterway management Plan: Mt. Hood National Forest. Department of Agriculture, Sandy, Oregon.
- Forest Service. 1995. Deschutes National Forest metolius watershed analysis. Department of Agriculture, Bend, Oregon. August 1995.
- Forest Service. 2003. Hells Canyon National Recreation Area comprehensive management plan. Department of Agriculture, Baker City, Oregon. June 2003.
- Forest Service. Bureau of Land Management. 1993. Salmon National Wild and Scenic River management plan. Department of Agriculture, Gresham, Oregon. Department of the Interior, Salem, Oregon.
- Forest Service. Bureau of Land Management. n.d. White River National Wild and Scenic River Environmental Assessment. Gresham and Prineville, Oregon.

- National Marine Fisheries Service and U.S. Fish and Wildlife Service. 1998. Recovery Plan for U.S. Pacific Populations of the Leatherhead Turtle. Silver Spring, Maryland and Portland, Oregon. January 1998.
- National Marine Fisheries Service and U.S. Fish and Wildlife Service. 1998. Recovery Plan for U.S. Pacific Populations of the Green Turtle. Silver Spring, Maryland and Portland, Oregon. January 1998.
- National Marine Fisheries Service and U.S. Fish and Wildlife Service. 1998. Recovery Plan for U.S. Pacific Populations of the Loggerhead Turtle. Silver Spring, Maryland and Portland, Oregon. January 1998.
- National Marine Fisheries Service and U.S. Fish and Wildlife Service. 1998. Recovery Plan for U.S. Pacific Populations of the Olive Ridley Turtle. Silver Spring, Maryland and Portland, Oregon. January 1998.
- National Marine Fisheries Service. 1991. Final Recovery Plan for the Humpback Whale. Silver Spring, Maryland. November 1991.
- National Marine Fisheries Service. 1998. Recovery Plan for the Blue Whale. Silver Spring, Maryland. July 1998.
- National Marine Fisheries Service. 2008. Recovery Plan for Southern Resident Killer Whales. Seattle, Washington. January 2008.
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## **11.5 Correspondence**

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

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**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	<i>Alosa sapidissima</i>	X				X
Black bullhead	<i>Ameiurus melas</i>			X		X
Black crappie	<i>Pomoxis nigromaculatus</i>			X		X
Bluegill	<i>Lepomis macrochirus</i>			X		X
Bridgelip sucker	<i>Catostomus columbianus</i>			X	X	
Brown bullhead	<i>Ameiurus nebulosus</i>			X		X
Brown trout	<i>Salmo trutta</i>			X		X
Bull trout	<i>Salvelinus confluentus</i>		X	X	X	
Burbot	<i>Lota lota</i>			X	X	
Channel catfish	<i>Ictalurus punctatus</i>			X		X
Chinook salmon	<i>Oncorhynchus tshawytscha</i>	X			X	
		X			X	
		X			X	
Chiselmouth	<i>Acrocheilus alutaceus</i>			X	X	
Coho salmon	<i>Oncorhynchus kisutch</i>	X			X	
Common carp	<i>Cyprinus carpio</i>			X		X
Cutthroat trout	<i>Oncorhynchus clarki</i>			X	X	
Grass carp	<i>Ctenopharyngodon idella</i>			X		X
Goldfish	<i>Carrassius auratus</i>			X		X
Lake whitefish	<i>Coregonus clupeaformis</i>			X		X
Largemouth bass	<i>Micropterus salmoides</i>			X		X
Largescale sucker	<i>Catostomus macrocheilus</i>			X	X	
Leopard dace	<i>Rhinichthys falcatus</i>			X	X	
Longnose dace	<i>Rhinichthys cataractae</i>			X	X	
Longnose sucker	<i>Catostomus catostomus</i>			X	X	
Mosquitofish	<i>Gambusia affinis</i>			X		X
Mottled sculpin	<i>Cottus bairdi</i>			X	X	
Mountain sucker	<i>Catostomus platyrhynchus</i>			X	X	
Mountain whitefish	<i>Prosopium williamsoni</i>			X	X	

Species Common Name	Scientific Name	Life History			Origin	
		Anadromous	Adfluvial	Resident	Native	Invasive/Introduced
Northern pikeminnow	<i>Ptychocheilus oregonensis</i>			X	X	
Pacific lamprey	<i>Entosphenus tridentata</i>	X			X	
Paiute sculpin	<i>Cottus beldingi</i>			X	X	
Peamouth	<i>Mylocheilus caurinus</i>			X	X	
Prickly sculpin	<i>Cottus asper</i>			X	X	
Pumpkinseed	<i>Lepomis gibbosus</i>			X		X
Rainbow trout	<i>Oncorhynchus mykiss</i>			X	X	
Redside shiner	<i>Richardsonius balteatus</i>			X	X	
Reticulate sculpin	<i>Cottus perplexus</i>			X	X	
River lamprey	<i>Lampetra ayresi</i>	X			X	
Sandroller	<i>Percopsis transmontana</i>			X	X	
Smallmouth bass	<i>Micropterus dolomieu</i>			X		X
Sockeye salmon	<i>Oncorhynchus nerka</i>	X			X	
Speckled dace	<i>Rhinichthy osculus</i>			X	X	
Steelhead	<i>Oncorhynchus mykiss</i>	X			X	
		X			X	
		X			X	
Tench	<i>Tinca tinca</i>			X		X
Three-spine stickleback	<i>Gasterosteus aculeatus</i>			X	X	
Torrent sculpin	<i>Cottus rhotheus</i>			X	X	
Walleye	<i>Sander vitreus</i>			X		X
Warmouth	<i>Lepomis gulosus</i>			X		X
Western brook lamprey	<i>Lampetra richardsoni</i>			X	X	
White crappie	<i>Pomoxis annularis</i>			X		X
White sturgeon	<i>Acipenser transmontanus</i>		X	X	X	
Yellow bullhead	<i>Ameiurus natalis</i>			X		X
Yellow perch	<i>Perca flavescens</i>			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	<i>Alosa sapidissima</i>	X	X	X	X	X
Black bullhead	<i>Ameiurus melas</i>	X	X	X	X	X
Black crappie	<i>Pomoxis nigromaculatus</i>	X	X	X	X	X
Bluegill	<i>Lepomis macrochirus</i>	X	X	X	X	X
Bridgelip sucker	<i>Catostomus columbianus</i>	X	X	X	X	X
Brown bullhead	<i>Ameiurus nebulosus</i>	X	X	X	X	X
Brown trout	<i>Salmo trutta</i>	X				X
Bull trout	<i>Salvelinus confluentus</i>	X				
Burbot	<i>Lota</i>	X	X	X	X	X
Channel catfish	<i>Ictalurus punctatus</i>	X	X	X	X	X
Chinook salmon	<i>Oncorhynchus tshawytscha</i>	X				
Chiselmouth	<i>Acrocheilus alutaceus</i>	X	X	X	X	X
Coho salmon	<i>Oncorhynchus kisutch</i>	X				
Common carp	<i>Cyprinus carpio</i>	X	X	X	X	X
Cutthroat trout	<i>Oncorhynchus clarki</i>	X	X	X	X	X
Goldfish	<i>Carrassius auratus</i>	X	X	X	X	X
Grass carp	<i>Ctenopharyngodon idella</i>	X	X	X	X	X
Lake whitefish	<i>Coregonus clupeaformis</i>	X	X	X	X	X
Largemouth bass	<i>Micropterus salmoides</i>	X	X	X	X	X
Largescale sucker	<i>Catostomus macrocheilus</i>	X	X	X	X	X
Leopard dace	<i>Rhinichthys falcatus</i>	X		X		X
Longnose dace	<i>Rhinichthys cataractae</i>	X	X	X	X	X
Longnose sucker	<i>Catostomus catostomus</i>	X	X	X	X	X
Mosquitofish	<i>Gambusia affinis</i>	X	X	X	X	X
Mottled sculpin	<i>Cottus bairdi</i>	X	X	X	X	X
Mountain sucker	<i>Catostomus platyrhynchus</i>	X	X	X	X	X
Mountain whitefish	<i>Prosopium williamsoni</i>	X				X
Northern pikeminnow	<i>Ptychocheilus oregonensis</i>	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	<i>Entosphenus tridentatus</i>	X				
Paiute sculpin	<i>Cottus beldingi</i>	X	X	X	X	X
Peamouth	<i>Mylocheilus caurinus</i>	X	X	X	X	X
Prickly sculpin	<i>Cottus asper</i>	X	X	X	X	X
Pumpkinseed	<i>Lepomis gibbosus</i>	X	X	X	X	X
Rainbow trout	<i>Oncorhynchus mykiss</i>	X		X		X
Redside shiner	<i>Richardsonius balteatus</i>	X	X	X	X	X
Reticulate sculpin	<i>Cottus perplexus</i>	X	X	X	X	X
River lamprey	<i>Lampetra ayresi</i>	X				X
Sandroller	<i>Percopsis transmontana</i>	X	X	X	X	X
Smallmouth bass	<i>Micropterus dolomieu</i>	X	X	X	X	X
Sockeye salmon	<i>Oncorhynchus nerka</i>	X				
Speckled dace	<i>Rhinichthy osculus</i>	X	X	X	X	X
Steelhead	<i>Oncorhynchus mykiss</i>	X				
Tench	<i>Tinca tinca</i>	X	X	X	X	X
Three-spine stickleback	<i>Gasterosteus aculeatus</i>	X	X	X	X	X
Torrent sculpin	<i>Cottus rhotheus</i>	X	X	X	X	X
Walleye	<i>Sander vitreus</i>	X	X	X	X	X
Warmouth	<i>Lepomis gulosus</i>	X	X	X	X	X
Western brook lamprey	<i>Lampetra richardsoni</i>	X				X
White crappie	<i>Pomoxis annularis</i>	X	X	X	X	X
White sturgeon	<i>Acipenser transmontanus</i>	X		X		X
Yellow bullhead	<i>Ameiurus natalis</i>	X	X	X	X	X
Yellow perch	<i>Perca flavescens</i>	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.

**Goldendale Energy Storage Project**  
**Goldendale, WA, May 2019**





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

**Goldendale Energy Storage Project**  
**Goldendale, WA, May 2019**





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

**Goldendale Energy Storage Project**  
**Goldendale, WA, May 2019**





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**

<b>Date:</b> April 24, 2015 and May 16, 2019
<b>District/ Field Office:</b> Prineville/Spokane
<b>Resource Area:</b> Spokane
<b>Activity (program):</b> Goldendale Pumped Storage

SECTION A. PROJECT INFORMATION

<p><b>1. Project Name:</b> John Day Pump Storage <b>2. Key Observation Point:</b> 1 <b>3. VRM Class:</b> N/A <b>Elevation:</b> 1719'</p>	<p><b>4. Location</b> <b>Township:</b> T3N <b>Range:</b> R17E <b>Section:</b> S4</p>	<p><b>5. Location details/Sketch:</b> Intersection of HW 97 and Hoctor Road</p> 
--	--	--

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												2. Does project design meet visual resource management objectives? <u>  X  </u> Yes <u>   </u> No (Explain on reverses side)
		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		3. Additional mitigating measures recommended <u>   </u> Yes <u>  X  </u> No    (Explain on reverses side)
	LINE			X			X					X		
	COLOR				X			X					X	
	TEXTURE				X			X					X	
												Evaluator's Names M. Alves and G. Turner C. Shoemaker and J. Moffett	Date 4/24/2015 5/16/2019	

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

<p><b>1. Project Name:</b> John Day Pump Storage <b>2. Key Observation Point:</b> 2 <b>3. VRM Class:</b> N/A <b>Elevation:</b> 1908'</p>	<p><b>4. Location</b> <b>Township:</b> T3N <b>Range:</b> R17E <b>Section:</b> S6</p>	<p><b>5. Location details/Sketch:</b> Intersection of Hoctor Road and Willis Road</p> 
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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
TEXTURE	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
TEXTURE	Uniform, fine surface, adds roughness to hills	Unchanged	Unchanged

SECTION D. CONTRAST RATING         SHORT TERM      X   LONG TERM

1. DEGREE OF CONTRAST		FEATURES												2. Does project design meet visual resource management objectives? <u>  X  </u> Yes <u>    </u> No (Explain on reverses side)  3. Additional mitigating measures recommended <u>    </u> Yes <u>  X  </u> No (Explain on reverses side)	
		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			Evaluator's Names M. Alves and G. Turner C. Shoemaker and J. Moffett	Date 4/24/2015 5/16/2019
	LINE		X				X				X				
	COLOR			X			X				X				
	TEXTURE			X			X				X				

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

<p><b>1. Project Name:</b> John Day Pump Storage  <b>2. Key Observation Point:</b> 3  <b>3. VRM Class:</b> N/A  <b>Elevation:</b> 3020'</p>	<p><b>4. Location</b>  <b>Township:</b> T3N  <b>Range:</b> R173  <b>Section:</b> S28</p>	<p><b>5. Location details/Sketch:</b> View of lower reservoir from Juniper Point</p> 
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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												2. Does project design meet visual resource management objectives? <u>  X  </u> Yes <u>    </u> No (Explain on reverses side)  3. Additional mitigating measures recommended <u>    </u> Yes <u>  X  </u> No    (Explain on reverses side)	
		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			Evaluator's Names M. Alves and G. Turner C. Shoemaker and J. Moffett	Date 4/24/2015 5/16/2019
	LINE		X				X				X				
	COLOR			X		X						X			
	TEXTURE			X		X						X			

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

<p><b>1. Project Name:</b> John Day Pump Storage <b>2. Key Observation Point:</b> 4 <b>3. VRM Class:</b> N/A <b>Elevation:</b> 950'</p>	<p><b>4. Location</b> <b>Township:</b> T3N <b>Range:</b> R173 <b>Section:</b> S28</p>	<p><b>5. Location details/Sketch:</b> View of lower plateau from pullout on Highway 14</p> 
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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												2. Does project design meet visual resource management objectives? <u>  X  </u> Yes <u>    </u> No (Explain on reverses side)  3. Additional mitigating measures recommended <u>    </u> Yes <u>  X  </u> No (Explain on reverses side)  Evaluator's Names M. Alves and G. Turner C. Shoemaker and J. Moffett
		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				Date 4/24/2015 5/16/2019
	LINE			X		X				X				
	COLOR		X			X				X				
	TEXTURE			X		X				X				



**ATTACHMENT 4:**  
**PHOTOMONTAGE**



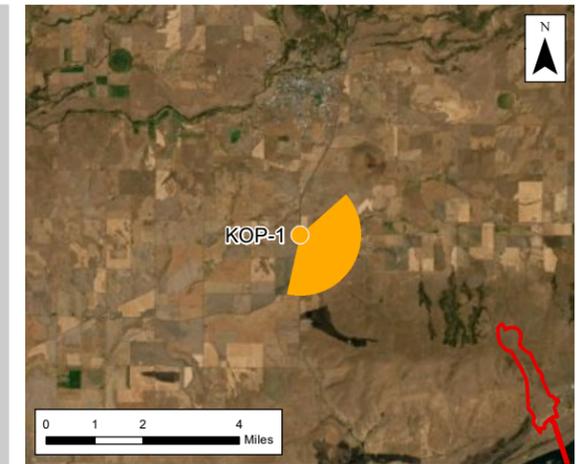
Existing View



Wireframe



Visual Simulation



**Legend**

- Key Observation Point (KOP) and View Angle

KOP-1  
 West of the intersection of Hactor 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°

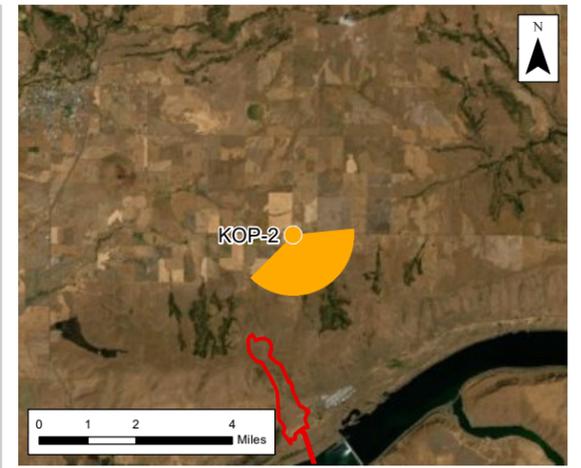
**Figure A-1**  
**KOP 1: Master Sheet**  
 Final License Application  
 Goldendale Energy Storage Project  
 Goldendale, WA



Existing View

Wireframe

Visual Simulation



Legend

● Key Observation Point (KOP) and View Angle

KOP-2  
Intersection of Willis Road and Hктор 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**  
Final License Application  
Goldendale Energy Storage Project  
Goldendale, WA



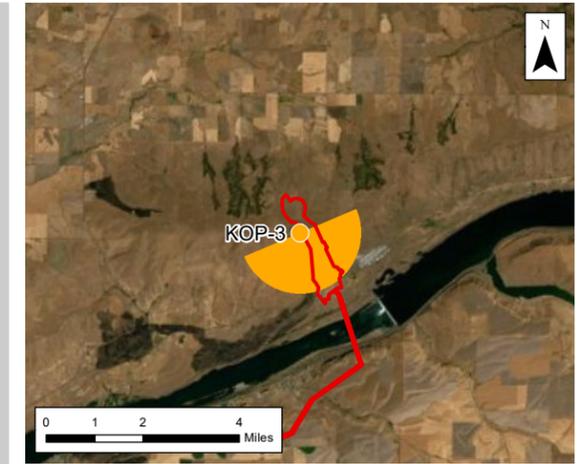
Existing View



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°

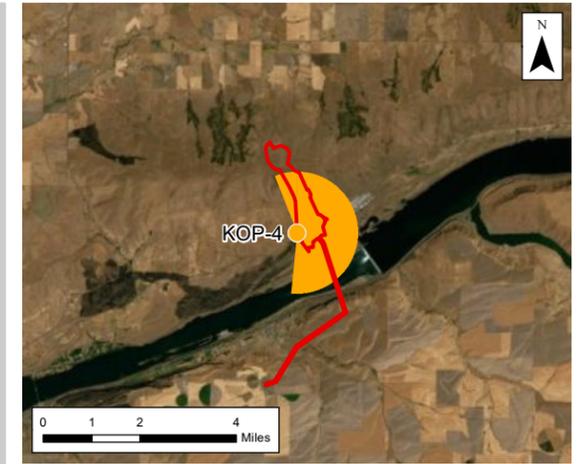
**Figure A-3**  
**KOP 3: Master Sheet**  
 Final License Application  
 Goldendale Energy Storage Project  
 Goldendale, WA



Existing View

Wireframe

Visual Simulation



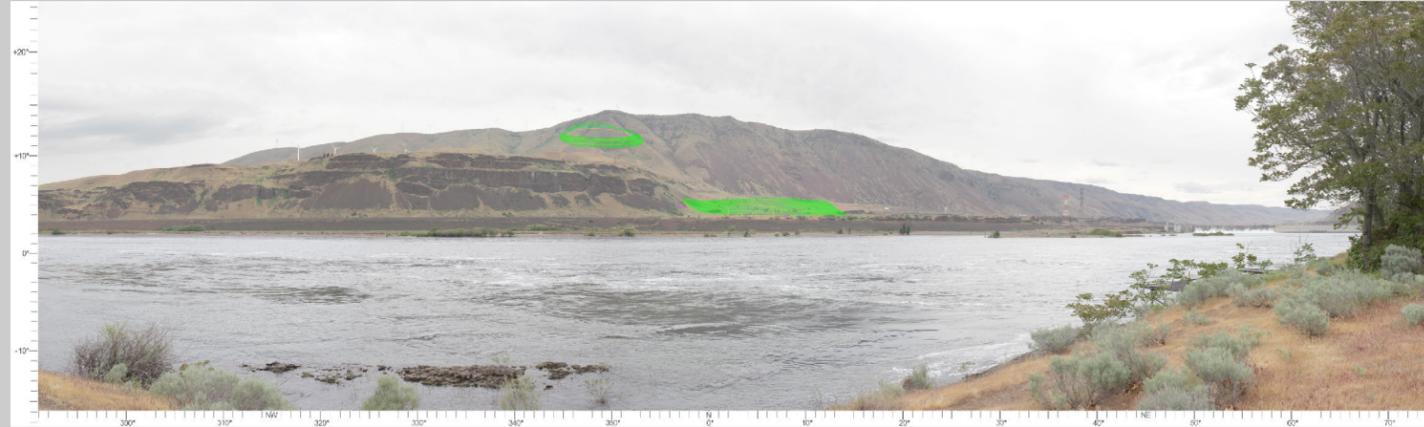
Legend

- 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°

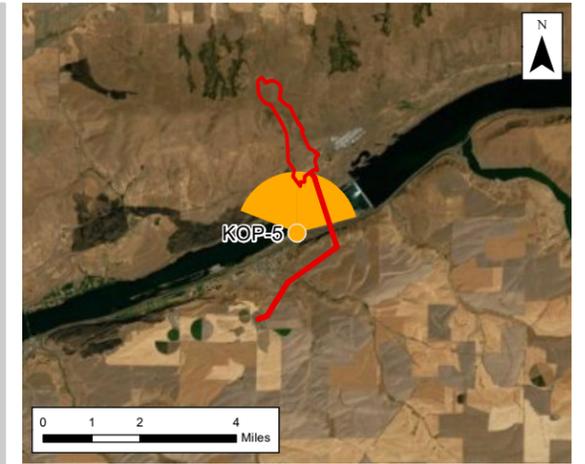
**Figure A-4**  
**KOP 4: Master Sheet**  
Final License Application  
Goldendale Energy Storage Project  
Goldendale, WA



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**  
Final License Application  
Goldendale Energy Storage Project  
Goldendale, WA

**ATTACHMENT 5:**

**WREA STUDY PLAN**

**STUDY PLAN WREA-S1  
WIND RESOURCES EFFECTS ANALYSIS**

*June 2020*

**STUDY GOAL AND OBJECTIVE**

In response to the December 2019 Draft License Application (DLA), the Federal Energy Regulatory Commission (FERC) and Turlock Irrigation District (TID) identified the following potential issues:

- The potential effect of the Project's upper reservoir's proposed arrangement and operations on individual Tuolumne Wind Project Authority (TWPA) wind turbine performance (i.e., wind redirection and turbulence increase reducing the wind turbine output); and
- The potential effect of Project construction on the operation and performance of the TWPA's wind turbines.

This wind resources effects analysis (WREA) study will analyze the air flow and turbulence around the upper reservoir.

The results will be used to inform final refinements of the upper reservoir, the specific details of which will be developed during final design in collaboration and consultation with the TWPA.

**EXISTING INFORMATION**

This study will include collection and review of pre-construction baseline data relevant to the design assumptions and intended operation of the wind turbines, such as: prevailing wind speed and direction, and turbulence. The study assumes coordination with TWPA to ensure all pertinent information is included.

**NEXUS BETWEEN PROJECT AND RESOURCE TO BE STUDIED AND HOW THE RESULTS WILL BE USED**

The proposed Project's upper reservoir is immediately adjacent to several TWPA wind turbines. TID is concerned that the upper reservoir could alter the wind patterns and characteristics such that turbine performance could be negatively impacted.

The results will be used to inform final refinements of the Project's upper reservoir.

**STUDY AREA AND SITES**

The study area includes the proposed Project upper reservoir and several surrounding TWPA wind turbines. Specific geographic parameters such as topography, wind directions and wind maps, and study area will be determined during initial study scoping during final design engineering, based on review of existing information.

## METHODS

This WREA will be performed in consultation with TWPA. The potential effect on turbine performance and operation due to the arrangement of the upper reservoir of the proposed Project will be analyzed in multiple-step study process, a preliminary outline of which is presented below.

Per request from FFP Project 101, LLC to assess the potential impact of the proposed Project on TWPA wind turbine performance, HDR Engineering provided technical input in developing the following study steps to be completed during final design of the Project by the selected EPC contractor.

### *Step 1. Initial Scoping and Consultation*

- The study will begin with TWPA, Washington Department of Fish & Wildlife, and U.S. Fish and Wildlife Service consulting with the developer to define the final area of study.
- Acceptance Criteria: A set of computational fluid dynamics (CFD) model results acceptance criteria will be developed in collaboration with the TID and used to determine acceptance of specific upper reservoir arrangements by comparison to the CFD model results.

### *Step 2. 3-D CFD Modeling*

A comprehensive 3-dimensional (3-D) CFD modeling effort will be undertaken in consultation with TWPA, Washington Department of Fish & Wildlife, and U.S. Fish and Wildlife Service. The 3-D CFD model will analyze air flow in the vicinity of the proposed upper reservoir and the results used to inform the final arrangement of the upper reservoir layout.

The 3-D CFD model will have the capability to evaluate changes to both the speed and direction of the wind induced by the arrangement and operation of the upper reservoir by comparing these characteristics to the existing condition. The model will also permit comparison of turbulence characteristics in the vicinity of the wind turbines between the baseline existing condition and the proposed condition with the reservoir constructed.

The 3-D CFD modeling effort is expected to include the following tasks.

#### *Existing Data Collection and Review*

Existing wind data for the wind turbines of concern are assumed to be available from TWPA or collected in collaboration with TWPA. These data will be reviewed and used to determine prevailing winds (direction and speed), which will then be used to establish preliminary wind scenarios for the CFD analysis. The design parameters for the turbines, their assumed operating conditions and assumptions, and the design criteria upon which these parameters were based are assumed to be available from TWPA.

### *Input Parameters and Model Scenarios*

CFD model inputs will include the existing ground surface topography in the vicinity of the reservoir, and those turbines that might be affected by airflow changes in the vicinity of the proposed reservoir. The ground surface topography that includes the shape of the upper reservoir and embankments, wind speed at the upwind boundary, and wind direction at the upwind boundary will also be determined. Turbulence measured, or assumed, in the original turbine design will be included in the model construction for comparative purposes. The upwind boundary and full CFD model domain will be selected based on review of topography and existing wind data.

A set of representative wind scenarios will be selected in consultation with TWPA. These scenarios will be selected to represent realistic scenarios of wind speed and direction. A baseline scenario will represent existing conditions without the upper reservoir, to which model results of other scenarios can be compared.

### *Model Selection and Development*

Several commercial state-of-the-art 3-D CFD modeling software packages are available to model air flow and turbulence. This study will include a review of available software and selection of the preferred software to use in consultation with TWPA, based on a comparison of the particular strengths and weaknesses of each package.

The CFD model domain will be defined in such a way to provide a representative characterization of the air currents in the vicinity of the wind turbines of concern.

### *Analysis*

The intent of the analysis is to determine if any refinements of the upper reservoir may be necessary. Potential modifications of the reservoir would be modeled until 3-D CFD model results indicate acceptable wind speed, direction, and turbulence conditions can be met, compared to the baseline scenario and based on the acceptance criteria agreed upon with TWPA. It is expected that several wind scenarios and CFD model runs will be completed as the design of the upper reservoir and embankment is adjusted based on the results of the CFD model.

The following refinements of the upper reservoir may be evaluated to reduce effects on the wind turbines:

- The height of the upper reservoir embankment may be reduced by increasing the excavated depth below existing ground of the reservoir to achieve the necessary storage volume, assuming that a lower profile of the embankments may reduce the wind ground effect of the reservoir.
- The upper reservoir footprint could be modified within the limits of the FERC Project Boundary to reduce the adverse effect of its proximity to the wind turbines and preserve the operational capability of the Project.

The incremental CFD model results will be presented to TWPA in a format that is relevant to the effects on operation and output of the wind turbines, and are expected to include the comparison in wind speed, wind direction, and turbulence to the baseline scenario results. The results will also be compared to the agreed upon acceptance criteria.

### **CONSISTENCY WITH GENERALLY ACCEPTED SCIENTIFIC PRACTICE**

Industry accepted software and standards would be used.

### **PRODUCTS**

The incremental CFD modeling results of each wind scenario and iteration of upper reservoir arrangement will be presented to TWPA.

After consultation with TWPA, the final results of this study will be reviewed and approved by FERC prior to issuing approval to start construction. The results will be presented in a form that demonstrates that the final upper reservoir configuration meets the agreed upon acceptance criteria. A combination of figures and tables to present the results associated with the final upper reservoir configuration is expected.

### **SCHEDULE**

The study will be completed in parallel with the final design engineering of the facility. The preliminary Project development schedule indicates a 2-year window (August 2022 through July 2024) within which these studies are expected to be completed.

### **LEVEL OF EFFORT AND COST**

An order of magnitude cost opinion (2020 dollars) for the study is approximately \$200,000.

### **REFERENCES**

None.