Proposed Goldendale Energy Storage Project

State Environmental Policy Act Draft Environmental Impact Statement

DEPARTMENT OF ECOLOGY
State of Washington

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June 2022

Publication and Contact Information

This document is available on the Washington Department of Ecology's website at:
https://apps.ecology.wa.gov/publications/SummaryPages/2206006.html

For more information contact:

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STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Central Region Office
1250 West Alder St., Union Gap, WA 98903-0009 • 509-575-2490

June 6, 2022

Dear Interested Parties, Tribes, Jurisdictions, and Agencies,

The Washington Department of Ecology (Ecology) is issuing this Draft Environmental Impact Statement (EIS) for the Proposed Goldendale Energy Storage Project (the proposed project). Free Flow Power Project 101, LLC (the Applicant) proposes to build a pumped-water storage system that is capable of generating energy through release of water from an upper reservoir downhill to a lower reservoir. The proposed project would be located along the Columbia River, primarily in Klickitat County, Washington, approximately 8 miles southeast of the City of Goldendale, on John Day Dam Road and adjacent to the former Columbia Gorge Aluminum smelter site.

The Draft EIS has been prepared to satisfy the requirements of the Washington State Environmental Policy Act. The purpose of the Draft EIS is to evaluate the probable significant environmental impacts from the construction and operation of the proposed project and its contribution to cumulative environmental impacts. In addition to the proposed project, the Draft EIS evaluates a No Action Alternative.

The following resource areas are evaluated in the Draft EIS:

- Soils and Geology
- Water Resources
- Air Quality and Greenhouse Gases
- Energy Resources
- Public Services and Utilities
- Aquatic Species and Habitats
- Terrestrial Species and Habitats
- Aesthetics/Visual Quality
- Cultural and Tribal Resources
- Environmental Health
- Land Use
- Recreation
- Transportation
- Environmental Justice

The Draft EIS proposes mitigation to address adverse environmental impacts of the proposed project identified in the review. In some cases, implementation of mitigation measures would reduce but not completely eliminate the significant adverse impacts and, in some cases, mitigation has not yet been identified. These are identified in the Draft EIS as significant and unavoidable adverse environmental impacts to Traditional Cultural Properties, archaeological sites, culturally important plants, and other Tribal resources. Some mitigation options for Tribal and cultural resources have been proposed by the Applicant. However, to date, there is no information available about mitigation proposed by or supported by the Tribes that would reduce the level of impact to less than significant. Impacts to Tribal resources will continue to be determined through ongoing government-to-government consultation.

Comments on this Draft EIS will be accepted during the 49-day comment period (June 6 through July 25, 2022). Comments should focus on the substance of the Draft EIS and be as specific as possible. This could include comments on the adequacy of the EIS, alternatives, methodology used, mitigation measures proposed, or additional information that should be considered. Comments may be submitted in the following ways:

By mail to:

Goldendale Energy Storage Project Draft EIS
Sage Park, Washington Department of Ecology, Central Regional Office
1250 W. Alder Street
Union Gap, WA 98903-0009

Online:

Complete a comment form at https://admin.ecology.commentinput.com/?id=KNBCY

In person at a public hearing:

June 28, 2022
Meeting begins at 6 p.m. with a presentation at 6:30 p.m.
Goldendale Grange
340 W. Darland Drive
Goldendale, WA 98620

In person at an online public hearing:

June 23, 2022
Online live event/hearing begins at 6 p.m.
https://ecology.wa.gov/Goldendale-Energy-EIS-Hearing-1

June 30, 2022
Online live event/hearing begins at 10 a.m.
https://ecology.wa.gov/Goldendale-Energy-EIS-Hearing-3

Comments received on the Draft EIS during the comment period will be compiled and reviewed. Comments will be considered by Ecology in the preparation of a Final EIS. Ecology anticipates the Final EIS will be published in late 2022. The Final EIS may be used by agencies to inform permit decisions for the proposed project.

Questions about the Draft EIS may be directed to: Meg Bommarito at meg.bommarito@ecy.wa.gov or 425-681-6236.

Sincerely,

Sage Park, Regional Director
SEPA Responsible Official
Washington Department of Ecology, Central Regional Office

Fact Sheet

Proposed Project Title

Proposed Goldendale Energy Storage Project

Description of Proposed Project and Alternatives

Free Flow Power Project 101, LLC (the Applicant) proposes to build a pumped-water storage system that is capable of generating energy through release of water from an upper reservoir downhill to a lower reservoir. The reservoirs would be off-stream of the Columbia River, with no river or stream impoundments, and vertically separated by 2,400 feet of elevation. The lower reservoir would be located on a portion of the former Columbia Gorge Aluminum (CGA) smelter site. Water to fill the pumped storage system would be drawn from a Public Utility District No. 1 of Klickitat County (KPUD) pump station adjacent to an intake pool off-stream from the Columbia River, under a permit that once served the aluminum plant. The pumped storage system would be initially filled then, as needed, would periodically need supplemental fills (make-up water) to offset water lost from evaporation or leakage from the system.

The facility would include the two reservoirs; an underground water conveyance tunnel and powerhouse; support structures; an electrical substation/switchyard; 115- and 500-kilovolt transmission lines; and a new aerial transmission line along existing transmission line corridors, connecting to Bonneville Power Administration's (BPA's) existing John Day Substation in Oregon. The proposed project is expected to generate up to 1,200 megawatts of electricity. It is also intended to provide balancing services and renewable energy flexible capacity to utilities in the Pacific Northwest and potentially California.

This Draft Environmental Impact Statement evaluates two alternatives, the proposed project and the No Action Alternative. Alternatives that did not meet the definition of a reasonable alternative were eliminated from further consideration. The No Action Alternative represents the most likely future conditions if the proposed project is not constructed. Under the No Action Alternative, none of the proposed project facilities would be constructed. Investigation of contamination on the cleanup site and development of cleanup actions would continue through a separate process. KPUD would continue to hold the existing water right, which may be held in trust or sold to other purchasers of water. Existing energy infrastructure would continue to be operated.

Location

The proposed project would be located along the Columbia River, primarily in Klickitat County, Washington, approximately 8 miles southeast of the City of Goldendale, on John Day Dam Road and adjacent to the former CGA smelter site. The proposed project area encompasses approximately 681.6 acres. The project area includes 621.9 acres of private lands primarily owned by NSC Smelter, LLC, and an existing utility right-of-way owned by BPA.

Applicant (Proponent)

Free Flow Power Project 101, LLC

Proposed Date of Implementation

The Applicant plans to begin pre-construction activities in 2023, begin construction in 2025, and complete facility commissioning to begin operation in 2030, if permitted.

Lead Agency

Washington Department of Ecology

Responsible Official

Sage Park, Regional Director
Washington Department of Ecology, Central Regional Office
1250 W. Alder Street, Union Gap, WA 98903-0009
509-480-1753
sage.park@ecy.wa.gov

Lead Agency Contact Person

Meg Bommarito, Regional Planner
Washington Department of Ecology, Northwest Region
15700 Dayton Avenue N., Shoreline WA 98133
425-681-6236
meg.bommarito@ecy.wa.gov

Potentially Required Permits, Licenses, and Approvals

Federal

- Hydroelectric License (Federal Energy Regulatory Commission)
- National Environmental Policy Act (Federal Energy Regulatory Commission)
- Endangered Species Act Consultation (U.S. Fish and Wildlife Service and National Oceanic and Atmospheric Administration Fisheries)
- National Historic Preservation Act Section 106 Consultation (Federal Energy Regulatory Commission)
- Large Generation Interconnection Agreement (Bonneville Power Administration)
- Federal Explosives License/Permit (Federal Bureau of Alcohol, Tobacco, and Firearms)
- Eagle Incidental Take Permit (U.S. Fish and Wildlife Service)
- Clean Water Act Section 404 Permit (U.S. Army Corps of Engineers)

Tribal

- Federal consultations under Section 106 of the National Historic Preservation Act, and Section 7 of the Endangered Species Act

Washington State

- Clean Water Act Section 401 Water Quality Certification (Washington Department of Ecology)
- Clean Water Act Section 402 National Pollutant Discharge Elimination System (NPDES) Construction Stormwater General Permit (Washington Department of Ecology)
- Clean Water Act Section 402 NPDES Industrial Stormwater Permit (Washington Department of Ecology)
- NPDES Construction Stormwater General Permit with Administrative Order for Proposed Cleanup Action (Washington Department of Ecology)

- NPDES Sand and Gravel General Permit (Washington Department of Ecology)
- Construction Phase Notice of Construction Air Quality Permit or Compliance with Washington Administrative Code 173.400.036 Portable Source Relocation Procedures (Washington Department of Ecology)
- Operation Phase Notice of Construction Air Quality Permit (Washington Department of Ecology)
- Washington State Explosives License (Department of Labor and Industries)
- Reservoir Permit (Washington Department of Ecology)
- Prospective Purchaser Consent Decree (Washington Department of Ecology)
- Scientific Collection Permit (Washington Department of Fish and Wildlife)
- Hydraulic Project Approval (Washington Department of Fish and Wildlife)
- Washington State Water Pollution Control Law Administrative Order (Washington Department of Ecology)
- Permit Pursuant to Washington Energy Code (Washington State Building Code Council)

Local and Regional

- Critical Areas Review (Klickitat County)
- Building Permit (Klickitat County)
- Fill and Grade Permit (Klickitat County)
- Floodplain Development Permit (Klickitat County)
- Zoning Conditional Use Permit (Klickitat County)

Authors and Principal Contributors

This document has been prepared under the direction of the Washington Department of Ecology. All chapters and appendices have been prepared for and approved by the Washington Department of Ecology. Key authors and principal contributors to the analyses are listed below.

- Washington Department of Ecology
- Washington Department of Fish and Wildlife
- Washington State Department of Archaeology and Historic Preservation
- Washington State Department of Transportation
- Anchor QEA, LLC
- Aspect Consulting, LLC
- Trinity Consultants, Inc.
- White Bluffs Consulting

Date of Draft Environmental Impact Statement Issuance

June 6, 2022

Date Comments Are Due

July 25, 2022

Public Comment and Hearings on the Draft Environmental Impact Statement

Comments on this Draft EIS will be accepted during a 49-day comment period (June 6 through July 25, 2022). Comments should focus on the substance of the Draft EIS and be as specific as possible. This could include comments on the adequacy of the EIS, alternatives, methodology used, mitigation measures proposed, or additional information that should be considered. Comments may be submitted in the following ways:

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Goldendale, WA 98620

June 30, 2022
Online live public hearing event
Verbal comments accepted
Begins at 10 a.m.
https://ecology.wa.gov/Goldendale-Energy-EIS-Hearing-3

Date Final Action Is Planned by Lead Agency

A Final EIS is estimated to be completed in late 2022.

Document Availability

The Draft EIS is posted on the following websites:

- SEPA Register at https://apps.ecology.wa.gov/separ/Main/SEPA
- Ecology website at ecology.wa.gov/Goldendale-Energy

The document is also available at the following locations:

Washington Department of Ecology
Central Regional Office
1250 W. Alder Street
Union Gap, WA 98903-0009

Goldendale Community Library
131 W. Burgen Street
Goldendale, WA 98620

Location of Background Materials

The EIS and associated resource analysis reports developed specifically for this environmental review are available on the project website: ecology.wa.gov/Goldendale-Energy

This project is also being reviewed for environmental impacts through the federal National Environmental Policy Act process. To review the federal environmental review documents, visit the Federal Energy Regulatory Commission document library:
https://elibrary.ferc.gov/eLibrary/docketsheet?docket_number=p-14861

Materials related to the cleanup are available on Washington Department of Ecology's website:
https://apps.ecology.wa.gov/cleanupsearch/site/11797

Cost of Copy of Environmental Impact Statement

To obtain a CD or printed copy of the Draft EIS (for the cost of production), follow the instructions provided at https://fortress.wa.gov/ecy/publications/UIPages/ProgramOrder.aspx?pubno=22-06-006

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Acronyms and Abbreviations

AFY	acre-feet per year
Applicant	Free Flow Power Project 101, LLC
BMP	best management practice
BPA	Bonneville Power Administration
CFR	Code of Federal Regulations
CGA	Columbia Gorge Aluminum
CL	Cultural Landscape
CO_2e	total carbon dioxide equivalent
Columbia Plateau	Columbia Plateau Physiographic Province
Ecology	Washington Department of Ecology
EIS	Environmental Impact Statement
FERC	Federal Energy Regulatory Commission
FLA	Final License Application
FR	Federal Register
GHG	greenhouse gas
KPUD	Public Utility District No. 1 of Klickitat County
kV	kilovolt
MPD	Multiple Property Documentation
MTCA	Model Toxics Control Act
MW	megawatt
NAVD88	North American Vertical Datum of 1988
NOC	Notice of Construction
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PM	particulate matter
RCW	Revised Code of Washington
RPH	rare plant habitat
SEPA	State Environmental Policy Act

SWMU	Solid Waste Management Unit
TCP	Traditional Cultural Property
TMDL	Total Maximum Daily Load
UA	unconsolidated aquifer
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
VMMP	Vegetation Management and Monitoring Plan
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WDNR	Washington Department of Natural Resources
WMP	Wildlife Management Plan
WSDOT	Washington State Department of Transportation
WSI	West Surface Impoundment
Yakama Nation	Confederated Tribes and Bands of the Yakama Nation

Summary

Introduction and Background

Free Flow Power Project 101, LLC (the Applicant) proposes to build a pumped-water storage system that is capable of generating energy through release of water from an upper reservoir downhill to a lower reservoir. The proposed project is primarily located in Klickitat County, Washington. Throughout the Draft Environmental Impact Statement (EIS), this will be referred to as the "proposed project."

The reservoirs would be off-stream of the Columbia River, with no river or stream impoundments. The lower reservoir would be located on a portion of the former Columbia Gorge Aluminum (CGA) smelter site. Water to fill the pumped storage system would be drawn from a Public Utility District No. 1 of Klickitat County (KPUD) pump station, adjacent to an intake pool off-stream from the Columbia River, under a permit that once served the aluminum plant. The pumped storage system would be initially filled then, as needed, would periodically be supplemented with make-up water to offset water lost from evaporation or leakage from the system. The proposed project is expected to generate up to 1,200 megawatts (MW) of electricity. It is also intended to provide balancing services and renewable energy flexible capacity to utilities in the Pacific Northwest and potentially California.

The Applicant's Proposed Project

- Two reservoirs vertically separated by 2,400 feet of elevation
- No river or stream impoundments
- An underground water conveyance tunnel and powerhouse
- An electrical substation/switchyard, along with 115- and 500-kilovolt transmission lines
- A new aerial transmission line, along existing transmission corridors, connecting to the Bonneville Power Administration's (BPA's) existing John Day Substation in Oregon, near the City of Rufus
- Support structures

The proposed project would be located along the Columbia River, approximately 8 miles southeast of the City of Goldendale, on John Day Dam Road and adjacent to the former CGA smelter site. The proposed project area encompasses approximately 681.6 acres. The project area includes 621.9 acres of private lands primarily owned by NSC Smelter, LLC, and an existing utility right-of-way owned by BPA. The project is described more fully in Chapter 2, Proposed Project Description and Alternatives, of the EIS.

Site Background and Project History

The proposed project's lower reservoir area is located on lands that previously housed the CGA smelter (also known as Harvey Aluminum, Martin Marietta Aluminum, Commonwealth Aluminum, or Goldendale Aluminum). This facility was a primary aluminum reduction smelter that generally operated from 1969 to 2003 and was added to the Washington Department of Ecology's (Ecology's) Hazardous Sites List in 1990. The CGA smelter was capped and closed in 2005 in compliance with applicable environmental laws and is currently being managed under a Model Toxics Control Act Agreed Order. Investigation of contamination on the site and development of cleanup actions are proceeding through a separate process.

A similar pumped storage project was proposed by KPUD in 2009 and was discussed with stakeholders. This similar project, referred to as the JD Pool Pumped Storage Hydroelectric Project, included a larger footprint and project boundary. However, this proposal did not advance beyond the feasibility stage.

The Applicant for the current proposed project was issued a preliminary permit from the Federal Energy Regulatory Commission (FERC) in 2018 with an order granting priority to the Applicant to file a license application. In 2020, the Applicant filed a Final License Application to FERC (FERC No. 14861). FERC conducted scoping under the National Environmental Policy Act (NEPA) in October 2020, which initiated their environmental analysis on the proposal and application. FERC issued notice that the hydroelectric application was filed and ready for environmental analysis on March 24, 2022, and included requests for comments, recommendations, terms and conditions, and prescriptions in the notice.

Purpose and Need

The Applicant's objective is to construct a pumped-storage hydropower facility along the Columbia River capable of generating 1,200 MW of electricity, which the Applicant has determined to be most appropriate for the proposed location and market conditions. The proposed project objective is based on the following criteria:

- **Reuse an Existing Industrial Site**: The proposed project would reuse part of the footprint of a previously developed industrial site.
- **Use an Existing Water Right and Water Intake**: The existing water right owned by KPUD would enable the proposed project to be built with no new water intake features and no new water right.
- **Be in Proximity to Complementary Energy Projects and Infrastructure**: The proposed project would be located near BPA transmission lines, the existing John Day Substation, and nearby wind farms, allowing potential interconnection to existing infrastructure while promoting alignment with nearby energy related land uses.

Environmental Review Process

Ecology prepared this Draft EIS to meet the requirements of the Washington State Environmental Policy Act (SEPA) (Chapter 43.21C of the Revised Code of Washington) and the SEPA Rules (Chapter 197.11 of the Washington Administrative Code [WAC]). The proposed project triggers SEPA review because it would require permits from state and local agencies. Other local, state, and federal agencies responsible for permits for the proposed project will use the Final EIS along with other information to inform permitting

The SEPA EIS

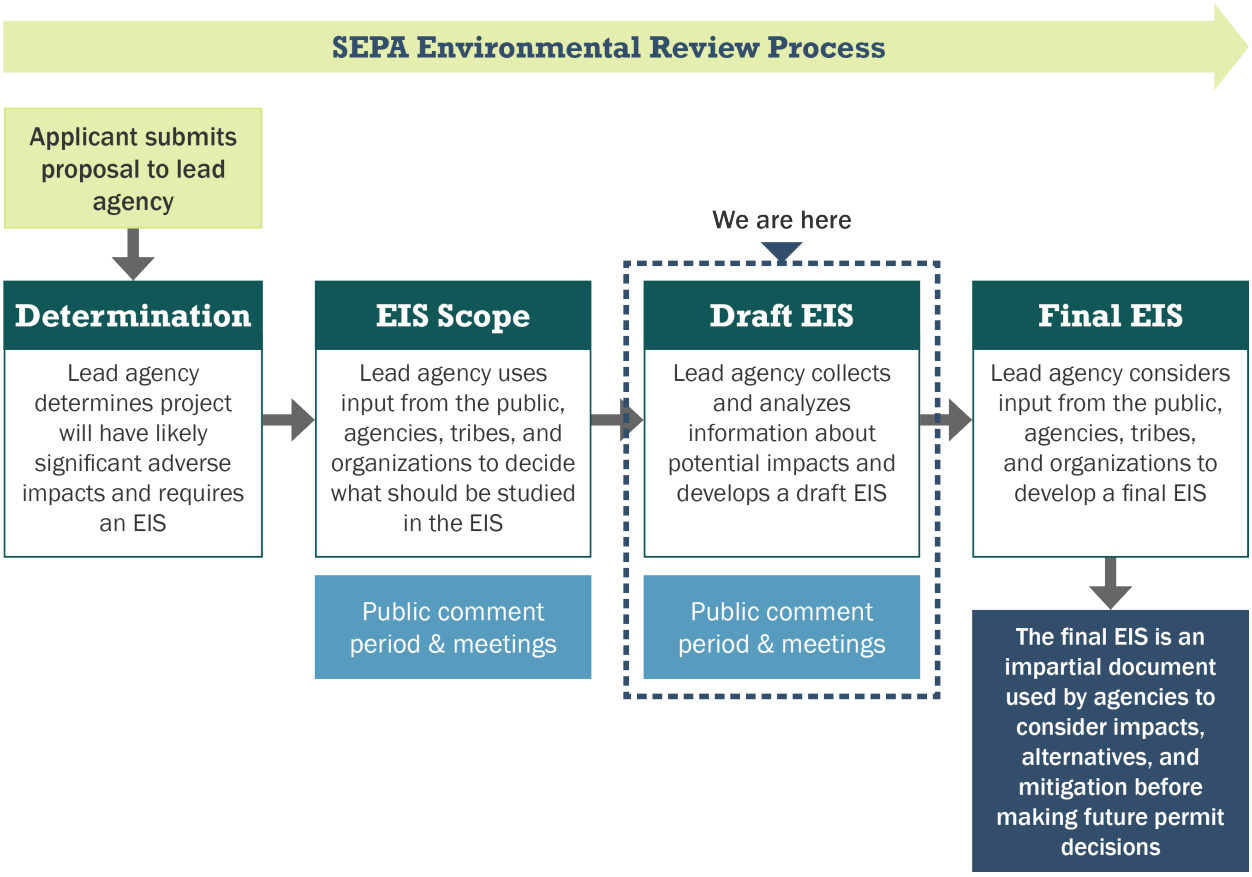
Under SEPA, an EIS is necessary if a proposed action is likely to result in significant adverse environmental impacts.

The purpose of an EIS is to provide the public and agencies with information about the effects of a proposed action and inform local and state agency permitting decisions.

An EIS is not a decision to approve or deny a proposal.

decisions. The required permits, licenses, and approvals are listed in Chapter 3 of the EIS and summarized in the Fact Sheet for the EIS.

Ecology, the lead agency for the EIS, has determined that the proposed project is likely to have a significant adverse impact on the environment and requires an EIS. This EIS provides a comprehensive and objective evaluation of probable significant adverse environmental impacts, reasonable alternatives, and mitigation measures that would avoid or minimize impacts. This EIS evaluates two alternatives, the proposed project and a No Action Alternative.



Separately, FERC is conducting an environmental review of the proposed project under NEPA. NEPA is required because the proposed project requires federal permits. The NEPA review is separate from this SEPA process.

SEPA Environmental Impact Statement Scoping Process

Ecology issued a Determination of Significance and conducted an EIS scoping period from January 14, 2021, through February 12, 2021. During the scoping period, Ecology held two online public scoping meetings on January 27 and February 3, 2021. During the scoping period, Ecology accepted comments by mail, via online form, and verbally during the online public meetings.

The Ecology Project Website

A website was developed to provide information through the duration of the SEPA process, including the scoping period:

ecology.wa.gov/Goldendale-Energy

Tribes, agencies, members of the public, and stakeholders were invited to participate in the scoping process and provide comments. Additional details on the scoping process and the comments received are in the *Scoping Summary Report* in Appendix A of the EIS.

Summary of Feedback Received During Scoping

Comments and feedback from the scoping period were about the SEPA process, project alternatives, the scope of analysis, mitigation, cumulative impacts, general project support or opposition, and many elements of the environment. The list below briefly summarizes some of the key issues or resources identified. A detailed summary of the scoping process and comments received is in the *Scoping Summary Report*. Key themes in scoping comments included:

- The Tribes' access to food and medicine in the area, including ongoing root and plant gathering access by Confederated Tribes and Bands of the Yakama Nation (Yakama Nation) Tribal members.
- The regulatory responsibility to protect Tribal lands and preserve irreplaceable Tribal treaty resources.
- The cumulative impacts to Tribal resources resulting from the proposed project and other energy infrastructure.
- Impacts to Tribal and cultural resources, as submitted by the Yakama Nation, the Confederated Tribes of the Umatilla Indian Reservation, and the Kah-Milt-Pah (Rock Creek Band of the Yakama Nation).
- Potential impacts to geology, air quality, fish, wildlife, cultural resources, transportation, Tribal religious resources, water quality, and waters of the United States.
- Whether impacts to Tribal cultural resources and other resources may be impossible to mitigate, and whether off-site mitigation will be sufficient to replace lost or adversely impacted habitats.
- Impacts to and compensatory mitigation for habitat and terrestrial species.
- Impacts of the proposal along with impacts from climate change and existing dams to determine the long-term survival of the Columbia River fishery.
- Impacts on water quality.
- The effects of the proposed project's additional water demands on fish and other aquatic resources, the waters that support them, and the overall habitat conditions necessary for their health and well-being.
- Potential impacts related to whether there would be reduced function in stormwater retention, hydrology/water flow, stream reach functions, and habitat of specific wetland features.

Alternatives Considered

To identify alternatives to be studied in the EIS, Ecology considered scoping comments regarding alternatives and the Applicant's FERC Final License Application (Anchor QEA 2021; FFP 2020a). Scoping comments suggested several other technologies and locations. The Applicant proposed three on-site design alternatives, with their preferred design alternative being carried forward into their FERC Final License Application as the proposed project.

Ecology evaluated the potential alternatives to determine whether they met the proposal's objective and associated criteria. Alternatives that did not meet the definition of a reasonable alternative—because they did not achieve the project objectives, would have a higher environmental cost, or were located off site—were eliminated from further consideration (see Section 2.5 of the EIS).

Reasonable Alternatives

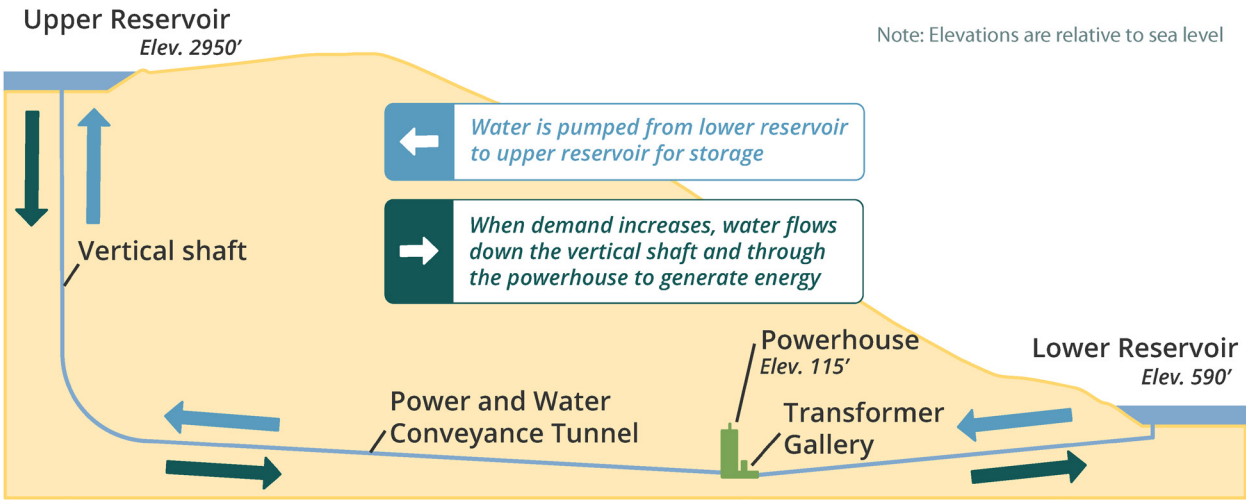
SEPA requires lead agencies to evaluate reasonable alternatives to the proposed project (WAC 197.11.786, 197.11.440(5)). Reasonable alternatives are defined as "actions that could feasibly attain or approximate a proposal's objectives, but at a lower environmental cost or decreased level of environmental degradation" (WAC 197.11.440).

Per WAC 197.11.440(5)(d), when a proposal is for a private project on a specific site, the lead agency shall be required to evaluate only the No Action Alternative plus other reasonable alternatives for achieving the proposal's objective on the same site. As such, alternative locations for the proposed project were not evaluated as alternatives for the EIS.

Ecology identified two alternatives to be evaluated in the EIS: the proposed project and the No Action Alternative.

Proposed Project

The proposed project is designed to generate electricity for up to 12 hours a day, up to a maximum of 1,200 MW and a minimum of 100 MW. Pumping water from the lower reservoir to the upper reservoir at the beginning of an operation cycle would take approximately 15 hours. Project operation can alternate between pumping and generating modes quickly and for different lengths of time to respond to market needs, and the operating cycle of pumping and generating would be dictated by market demand (FFP 2020a). The estimated annual power generation if the project was generating power for 8 hours a day, 7 days a week would be 3,500 gigawatt-hours.



The volume of water required to initially fill the project facilities is estimated to be 7,640 acre-feet, which includes the 7,100 acre-feet operating volume for the lower reservoir, water that will remain in the upper

and lower reservoirs beyond the operating volume, and the volume that will fill the water conveyance tunnels (FFP 2020a). It is assumed that the initial fill would be completed over 6.5 months near the end of the construction period (likely between October to March). The timing of the initial fill would depend on the timing of construction activities, such as the lower reservoir construction and the completion of the reservoir fill pipeline to the lower reservoir. The proposed project would be commissioned during the fifth year of construction. It is estimated that the proposed project would require 360 acre-feet of water each year to replenish water lost through evaporation.

Water for the initial fill of the system and periodic refill water would be purchased from KPUD using a KPUD-owned conveyance system and existing water right. This water supply would be sourced from KPUD's existing intake pool off-stream from the Columbia River. Water would be conveyed through a buried 2.5-foot-diameter water fill line leading from a shut-off and throttling valve within a water supply vault owned by KPUD to an outlet structure within the lower reservoir.

No Action Alternative

The No Action Alternative represents the most likely future conditions if the proposed project is not constructed. Under the No Action Alternative, none of the proposed project facilities would be constructed. Investigation of contamination on the cleanup site and development of cleanup actions would continue through a separate process. KPUD would continue to hold the existing water right, which may be held in trust or sold to other purchasers of water. The wind energy project and other existing energy infrastructure would continue to be operated. The analysis for the No Action Alternative is based on the expected conditions in 2030, which is the year that construction of the Applicant's proposed project would be expected to be completed.

Major Conclusions

Table S-1 provides a summary of probable significant adverse impacts from construction and operation of the proposed project for each environmental resource that was analyzed. Although the proposed project would result in significant adverse impacts to terrestrial species and habitat, these impacts were found to be reduced through proposed mitigation and would not result in significant and unavoidable adverse impacts. Mitigation measures considered in the EIS include those proposed by the Applicant as well as those required by applicable permits or proposed to date by State agencies. The measures considered are those that could further avoid, minimize, reduce, or compensate for the identified impacts. Final mitigation measures would be included as conditions of the required project permits or as articles to the FERC license.

Construction and operation of the proposed project would have unique and significant adverse impacts on Tribal and cultural resources, Tribal communities, and Tribal members. Tribal traditions are interwoven into the ecosystems in which Tribal members live, from hunting and gathering to sacred sites—places and activities that have spiritual and cultural meaning. Some mitigation options for Tribal and cultural resources have been proposed by the Applicant. However, to date, there is no information available about mitigation proposed by or supported by the Tribes that would reduce the level of impact to less than significant. Through scoping comments to Ecology and other agencies, conversations during technical meetings, media releases, and a Yakama Nation Tribal council resolution, Tribes have repeatedly indicated it is not likely that mitigation would reduce project impacts to Tribal and cultural resources. It is expected that there would be significant and unavoidable adverse impacts to Traditional Cultural Properties (TCPs), archaeological sites, culturally important plants, and other Tribal resources. Impacts to Tribal resources will continue to be determined through ongoing government-to-government consultation.

Table S-1
Summary of Impacts and Proposed Mitigation

RESOURCE	IMPACT FINDING	SUMMARY DESCRIPTION	SUMMARY OF PROPOSED MITIGATION [1]
Soils and Geology (see Section 4.1)	No significant adverse impacts	• Possibly some impacts on slope stability, but there is uncertainty related to geologic conditions. • Removal of vegetation and exposure of soils, increasing the potential for erosion. • A local or regional earthquake could cause liquefaction, potentially resulting in damage to project elements. Local faults are unlikely to produce earthquakes. The area is in the moderate shaking zone for a Cascadia Subduction Zone earthquake.	• Although mitigation is not required to reduce any significant adverse impacts, additional geotechnical studies, sediment and erosion control plans, implementation of best management practices (BMPs), and design updates are proposed to reduce some impacts.
Water Resources (see Section 4.2)	No significant adverse impacts	• Permanent impact to 0.09 acre of wetlands and streams and 1.34 acres of stream buffer. • Temporary impact to 0.06 acre of wetlands and streams and 0.89 acre of stream buffer. • Water required from the Columbia River through existing water right/authorized consumptive use (7,640 acre-feet initially and estimated 360 acre-feet per year). • Reservoirs would capture precipitation and the system would result in some evaporation and leakage, but would not substantially alter surface water hydrology. • Some alteration to groundwater flow. • Controlled temporary increases in turbidity and pollutants in stormwater. • Water quality degradation in the pumped storage system, but not expected to impact water quality in receiving waters.	• Mitigation is not required to reduce any significant adverse impacts. However, compensatory mitigation for impacts on wetlands and waterbodies will be required through permitting. Measures are also proposed to reduce some impacts. • Compensatory wetland and stream mitigation. • Restoration of disturbed wetlands and streams. • Compensatory buffer mitigation. • Restoration of disturbed buffers. • Shade balls in reservoirs. • Reservoir Water Quality Monitoring Plan. • Construction Water Resource Monitoring and Response Plan. • Operations Water Resource Monitoring and Response Plan.
Air Quality and Greenhouse Gases (see Section 4.3)	No significant adverse impacts	• Estimated total greenhouse gas emissions of 87,919 metric tons CO_2e for construction (17,584 metric tons annually for 5 years) and 80,708 metric tons CO_2e for operations (1,614 metric tons annually for 50 years). • Emissions of some criteria pollutants, greenhouse gases, and hazardous/toxic air pollutants would likely reach levels at which Washington State permits, approvals, and annual reporting may be required.	• Although mitigation is not required to reduce any significant adverse impacts, strategies are proposed to further reduce potential emissions including use of BMPs during construction and selection of efficient equipment. • Additional measures may be required as part of state air quality permitting.

RESOURCE	IMPACT FINDING	SUMMARY DESCRIPTION	SUMMARY OF PROPOSED MITIGATION [1]
Energy Resources (see Section 4.4)	No significant adverse impacts	• Energy resources would not be constrained. • Energy use would be consistent with local and regional plans and would not impact adjacent uses of energy.	• Mitigation is not required to reduce any significant adverse impacts.
Public Services and Utilities (see Section 4.5)	No significant adverse impacts	• Some public services could be temporarily disrupted by construction-related traffic or road detours throughout the 5-year period of construction.	• Mitigation is not required to reduce any significant adverse impacts. • Impacts would be further reduced by the Transportation Impact Analysis.
Aquatic Species and Habitats (see Section 4.6)	No significant adverse impacts	• Permanent loss of 0.09 acre of aquatic habitat. • Temporary disturbance of 0.06 acre of aquatic habitat. • Infrequent mortality, injury, and temporary disturbance to amphibians and turtles could occur during the 5-year construction period. • Indirect impacts on aquatic habitat and fish in the Swale Creek watershed from a permanent or multi-year reduction in ecological function. • Aquatic habitat and species in the Columbia River are not anticipated to be affected.	• Although mitigation is not required to reduce any significant adverse impacts, measures are proposed to reduce some impacts. • Mitigation will be required for impacts to wetlands and waterbodies (see Section 4.2). • Clean Water Act compensatory mitigation, Stormwater Pollution Prevention Plan, and Soil Erosion Control Plan. • Measures that may be required as part of Washington Department of Fish and Wildlife's (WDFW's) Hydraulic Project Approval process. • Vegetation Management and Monitoring Plan (VMMP) and Wildlife Management Plan (WMP). • WDFW-proposed addition to the WMP for wildlife surveys to include aquatic species. • WDFW-proposed addition to the WMP for amphibian salvage during construction. • Construction and Operations Water Resource Monitoring and Response Plans.

RESOURCE	IMPACT FINDING	SUMMARY DESCRIPTION	SUMMARY OF PROPOSED MITIGATION [1]
Terrestrial Species and Habitats (see Section 4.7)	**No significant and unavoidable adverse impacts with implementation of proposed mitigation measures**	• Direct and indirect impacts on special status species including golden eagle, little brown bat, smooth desert parsley, and other rare plants. • Permanent loss of 193.6 acres of existing habitat. • Temporary disturbance of 54.3 acres of habitat. • Indirect impacts to habitat function and quality for some species during operations. • Plants, mammals, reptiles, and invertebrates could experience mortality and birds could experience disturbance during the 5-year construction period, but species viability would not be adversely affected.	• VMMP, which includes restoration, protection, weed management, revegetation, and monitoring measures. • WMP, which includes: – Purchase of an off-site property for compensatory mitigation for habitat impacts – Surveys, monitoring, and reporting – Scheduling and work area limits – Noise, light, traffic, and dust control measures – Training – Wildlife deterrents – Development of additional mitigation measures with agencies • WDFW-proposed additions to the WMP for peregrine falcon and raptor monitoring, mitigation, and protection measures. • WDFW-proposed additions to the WMP for bat surveys and deterrent measures.
Aesthetics/ Visual Quality (see Section 4.8)	No significant adverse impacts There would be impacts to Tribes from the view changes, which are described in Section 4.9	• Construction visual changes would disrupt natural harmony, cultural order, and coherence, and may affect viewers intermittently over 5 years. • The facility would be a dominant structure from some viewpoints but only seen at a distance from the most accessible areas. Viewers may be aware of the visual changes; however, important views would still be available.	• Although mitigation is not required to reduce any significant adverse impacts, measures are proposed to reduce some impacts. • Minimize construction debris. • Design to reduce degree of contrast. • Revegetate some areas. • Minimize exterior lighting and nighttime light pollution. • Dust control and other BMPs.

RESOURCE	IMPACT FINDING	SUMMARY DESCRIPTION	SUMMARY OF PROPOSED MITIGATION [1]
Cultural and Tribal Resources (see Section 4.9)	**Significant and unavoidable adverse impacts**	• The proposed project will have unique significant and unavoidable adverse impacts on Tribal communities and Tribal members. • Limitations or elimination of resource gathering and other ritual and cultural activities associated with the TCPs *Pushpum* and *Nch'ima* as well as other TCPs for which names have not been shared. • Impacts to Tribal members' ability to participate in, teach, and share cultural practices affects the mental, spiritual, and physical health of Tribal members. • Restrictions to access and removal of areas used for cultural practices that indirectly affect entire Tribal communities. • Visual changes in the natural state of the landscape that could interrupt Tribal cultural practices and impact the expression of Tribal spirituality. This change also constitutes an impact to the TCPs. • Access to traditional gathering areas for medicinal and traditional plants and foods would be restricted, and permanently lost in the reservoir areas. • Potential impacts to wildlife species that are used by Tribes for cultural or spiritual practices. • Potential impacts on recorded and unrecorded archaeological sites associated with TCPs. • Archaeological sites and the Columbia Hills Archaeological District will be impacted by construction. • Department of Archaeology and Historic Preservation estimates 15 sites could be disturbed.	• Some mitigation options for Tribal and cultural resources have been proposed by the Applicant. However, to date, there is no information available about mitigation proposed by or supported by the Tribes that would reduce the level of impact to less than significant.
Environmental Health (see Section 4.10)	No significant adverse impacts	• Construction and operation of the proposed project could cause possible spills, discharge, or disturbance of hazardous or contaminated materials. • Completing the West Surface Impoundment removal would permanently remove a large quantity of contaminated materials. • Noise and vibration are expected to be temporary and occur in areas where very few people could be affected. • There would be an extremely low probability for failure of a reservoir.	• Mitigation is not required to reduce any significant adverse impacts. Required permits, plans, and monitoring would further reduce any associated risks for environmental health. • Impacts would be reduced by the Construction and Operations Water Resource Monitoring and Response Plans, the dust control and other BMPs, and the WMP.

RESOURCE	IMPACT FINDING	SUMMARY DESCRIPTION	SUMMARY OF PROPOSED MITIGATION [1]
Land Use (see Section 4.11)	No significant adverse impacts	• Conversion from undeveloped space and previous industrial operations to a utility-scale pumped hydropower facility. • May require a conditional use permit from Klickitat County based on existing zoning, but would not require a modification or amendment to an existing zoning, planning, or policy document.	• Although mitigation is not required to reduce any significant adverse impacts, zoning coordination with Klickitat County may be required for a conditional use permit to address the inconsistency of the proposed land use within the project area.
Recreation (see Section 4.12)	No significant adverse impacts	• Temporary and intermittent traffic and access changes to recreational opportunities and access to facilities within 10 miles of the proposed project area during construction.	• Although mitigation is not required to reduce any significant adverse impacts, measures are proposed to reduce some impacts. • Visual and Recreation Resource Management Plan. • Recreational access traffic coordination. • Interpretive sign. • Transportation Impact Analysis.
Transportation (see Section 4.13)	No significant adverse impacts	• Construction traffic, road closures, and detours would result in temporary increases in traffic interference and congestion on regional and local roads and highways throughout construction.	• Although mitigation is not required to reduce any significant adverse impacts, measures are proposed to reduce some impacts. • Construction traffic coordination. • Construction Traffic Management Plan. • Transportation Impact Analysis.
Environmental Justice (see Section 4.14)	No significant adverse impacts	• No significant adverse impacts related to environmental justice. • No disproportionate impact on communities of color or low-income populations.	• Mitigation is not required to reduce any disproportionate impacts to communities of color and low-income populations.

Note:

1. Mitigation measures include those proposed by the Applicant as well as those required by applicable permits or proposed to date by state agencies.

Areas of Controversy and Uncertainty

There is uncertainty related to subsurface conditions on the site, including geologic conditions and the location of a potential groundwater divide separating the aquifers of the northern and southern portions of the study area. Additional geotechnical studies proposed by the Applicant are expected to address this uncertainty as the design process proceeds.

Due to uncertainties in the quantities and specific off-site sources of construction materials and disposal locations, the Draft EIS uses assumptions for these considerations in the analyses related to transportation, energy use, and emissions. This uncertainty will be reduced as the Applicant's design is refined.

Another area of uncertainty is the magnitude of the future effects of climate change and how the changing climate will affect water availability, as well as some species and habitats. However, based on the information available, it is not anticipated that these climate changes would substantially alter the impact determinations in the Draft EIS.

As previously noted, some mitigation options for Tribal and cultural resources have been proposed by the Applicant, but the Tribes have indicated that this is not sufficient. To date, there is no information available about mitigation proposed by or supported by the Tribes that would reduce the unique impacts on Tribal and cultural resources to a level that is less than significant.

More detailed studies and review—including identification of specific impacts and mitigation measures—would be conducted during the permitting processes, before implementation of the proposed project, and would be expected to reduce uncertainties.

Next Steps

Ecology will review and consider all comments received during the public comment period and may make edits to the EIS as a result. The Final EIS is estimated to be completed in late 2022 and will be released to the public.

The Final EIS will provide information for public, local, and state agencies to support decision-making regarding permits for the proposed project. All primary local, regional, state, and federal permits must be issued before the proposed project may begin.

1 Introduction and Background

1.1 Environmental Impact Statement Overview

Free Flow Power Project 101, LLC (the Applicant) proposes to build a pumped-water storage system that is capable of generating energy through release of water from an upper reservoir downhill to a lower reservoir. The proposed project is primarily located in Klickitat County, Washington (Figure 1.1-1). Throughout the Environmental Impact Statement (EIS), this will be referred to as the "proposed project."

The Washington Department of Ecology (Ecology), the lead agency for the EIS, determined that the proposed project is likely to have a significant adverse impact on the environment and required an EIS. An EIS evaluates the probable significant adverse impacts on the environment that would result from construction and operation of a proposed project. This EIS evaluates two alternatives: the proposed project and a No Action Alternative.

Ecology has prepared this Draft EIS to meet the State Environmental Policy Act (SEPA) requirements in the Washington Administrative Code (WAC).[1] The EIS does not approve or deny a proposed project. It provides a comprehensive and objective evaluation of probable significant adverse environmental impacts, reasonable alternatives, and mitigation measures that would avoid or minimize impacts. State and local agencies will use the information in this EIS, along with other publicly available information, to inform decisions on permits or other approvals.

The Proposed Project

Applicant: Free Flow Power Project 101, LLC

Proposed project: Build a pumped-water storage system capable of generating energy through release of water from an upper reservoir downhill to a lower reservoir.

Environmental Review Terminology

Lead agency: Agency responsible for preparing the EIS. Ecology is the lead agency for this EIS.

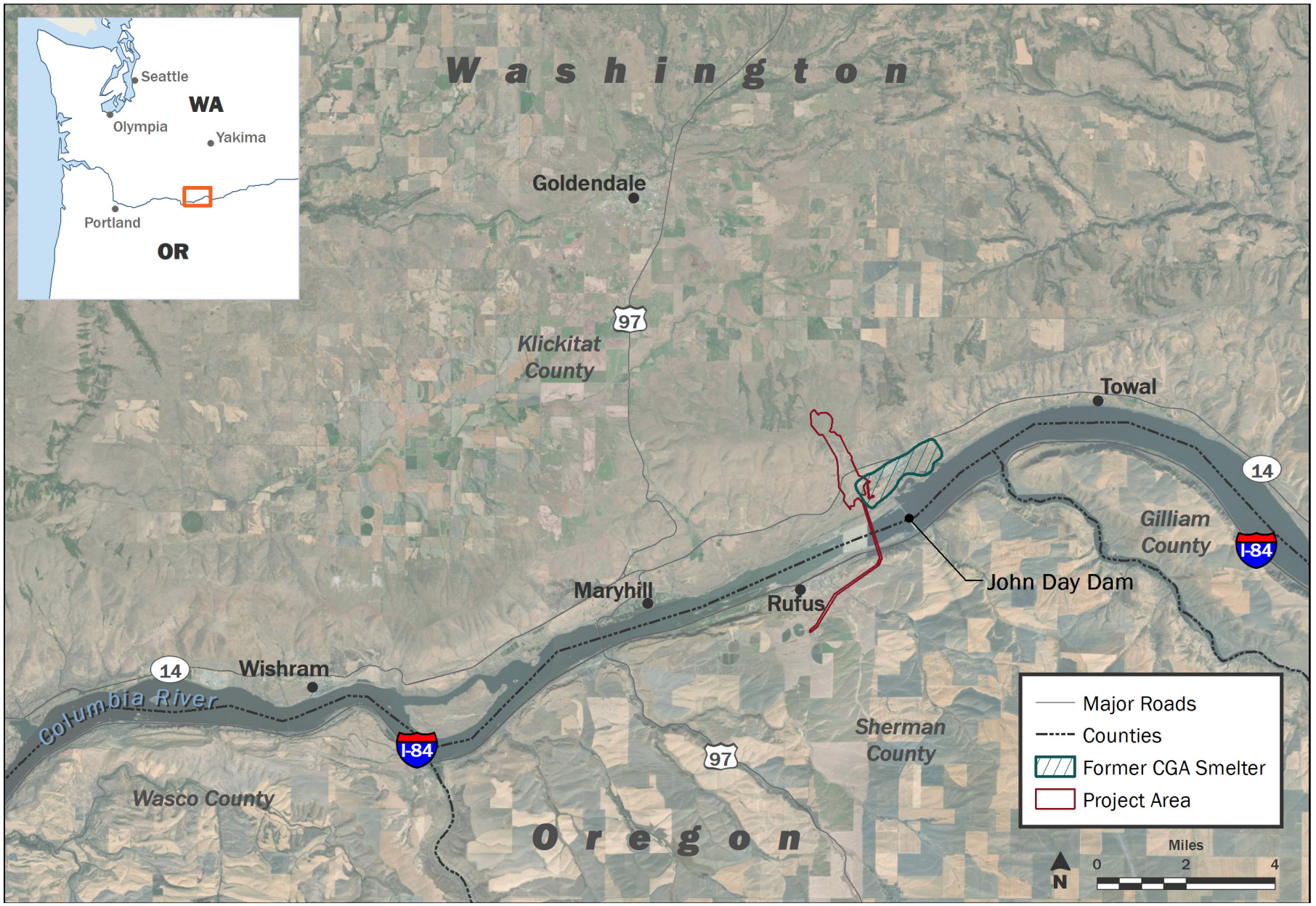
State Environmental Policy Act (SEPA): Washington State law that is intended to ensure that environmental values are considered during decision-making actions by state and local agencies. State and local agencies will use this SEPA EIS as part of any future permitting decisions or other approvals related to the project.

Environmental Impact Statement (EIS): Fact-based document that identifies the probable significant adverse impacts from the proposed project and alternatives. It also looks at mitigation to avoid or minimize impacts.

EIS alternatives: An action that meets the Applicant's objectives but at a lower environmental cost. This EIS has two alternatives: the proposed project and the No Action Alternative.

[1] WAC Section 197.11, SEPA Rules

Figure 1.1 1
Project Area Map



1.2 Proposed Project and Alternatives

1.2.1 Proposed Project

The Applicant proposes to construct and operate a pumped-water storage system that would be used to release water from an upper reservoir downhill to a lower reservoir to generate energy. The reservoirs would be located off-stream of the Columbia River. The lower reservoir would be located on a portion of the former Columbia Gorge Aluminum (CGA) smelter site. Water to fill the pumped storage system would be drawn from a Public Utility District No. 1 of Klickitat County (KPUD) pump station adjacent to an intake pool off-stream from the Columbia River, under a permit that once served the aluminum plant. The pumped storage system would be initially filled then, as needed, would periodically need supplemental fills (make-up water) to offset water lost from evaporation or leakage from the system.

The proposed project is expected to generate up to 1,200 megawatts (MW) of electricity. It is also intended to provide balancing services and renewable energy flexible capacity to utilities in the Pacific Northwest and potentially California. The Applicant's proposed project includes the following:

- Two reservoirs vertically separated by 2,400 feet of elevation
- No river or stream impoundments
- An underground water conveyance tunnel and powerhouse
- An electrical substation/switchyard, along with 115- and 500-kilovolt (kV) transmission lines
- A new aerial transmission line, along existing transmission line corridors, which connects to Bonneville Power Administration's (BPA's) existing John Day Substation in Oregon, near the City of Rufus
- Support structures

The proposed project would be located along the Columbia River, primarily in Klickitat County, Washington, approximately 8 miles southeast of the City of Goldendale, on John Day Dam Road and adjacent to the former CGA smelter site. The proposed project area encompasses approximately 681.6 acres. The project area includes 621.9 acres of private lands primarily owned by NSC Smelter, LLC, and an existing utility right-of-way owned by BPA.

1.2.2 Project Background and History

The proposed project's lower reservoir area would be on lands that previously housed the CGA smelter (also known as Harvey Aluminum, Martin Marietta Aluminum, Commonwealth Aluminum, or Goldendale Aluminum). This facility was a primary aluminum reduction smelter that generally operated from 1969 to 2003, with a few periods when the plant was shut down or had limited operation. The facility was added to Ecology's Hazardous Sites List in 1990. The CGA smelter was capped and closed in 2005 in compliance with applicable environmental laws and is currently being managed under a Model Toxics Control Act (MTCA) Agreed Order.

A similar pumped storage project was proposed by KPUD in 2009, referred to as the JD Pool Pumped Storage Hydroelectric Project, which included a larger footprint and project boundary. The Federal Energy Regulatory Commission (FERC) issued a preliminary permit for the JD Pool Pumped Storage Hydroelectric Project in 2009. However, this proposal did not advance beyond the feasibility stage.

KPUD sponsored Washington State Senate Bill 6044, titled "Concerning the supply of water by public utility districts by the Columbia river to be used in, or power from, pumped storage projects." Senate Bill 6044 was passed and signed into law in March 2012, as Revised Code of Washington (RCW)

Section 54.16.410 (Washington State Legislature 2021). RCW 54.16.410 authorizes qualifying public utility districts to supply water, if authorized by a previously perfected water right under its control, to a pumped storage facility within certain parameters.

In October 2017, the Applicant filed an application for a preliminary permit with FERC. In March 2018, FERC issued a preliminary permit to the Goldendale Energy Storage Project and issued an order granting priority to the Applicant to file a license application. In June 2020, the Applicant filed a Final License Application (FLA) to FERC (FERC No. 14861) and requested an expedited licensing process. The request for an expedited licensing process was denied by FERC and the Applicant is now undergoing a traditional licensing process. FERC conducted scoping under the National Environmental Policy Act in October 2020, which initiated their environmental analysis on the proposal and application. FERC issued notice that the hydroelectric application was filed and ready for environmental analysis on March 24, 2022, and included requests for comments, recommendations, terms and conditions, and prescriptions in the notice.

Before FERC can license a hydropower project, Ecology must first issue a Clean Water Act Section 401 Water Quality Certification, certifying that the project will meet state water quality requirements. The Applicant submitted an application for a 401 Water Quality Certification for the project in June 2020. After a thorough review of the Applicant's request, Ecology determined in June 2021 that the information submitted was insufficient to determine if the activities and impacts associated with construction and operation of the project could be conducted in a manner that would not violate applicable water quality laws. Ecology issued a denial without prejudice based on the lack of information, not the merits of the project. In denying this request without prejudice, Ecology recognized the application was made early in the project's timeline and lacked relevant information necessary for the agency to conduct its review and issue a decision.

1.2.3 Alternatives

To identify alternatives, Ecology considered scoping comments regarding alternatives to be studied in the EIS and the Applicant's FERC FLA. Alternatives that did not meet the definition of a reasonable alternative were eliminated from further consideration and are discussed in Section 2.5. These were concepts that did not achieve the Applicant's project objectives as described in Section 2.1, would have a higher environmental cost, or were located off site.

Ecology identified two alternatives to be evaluated in this EIS: the proposed project and the No Action Alternative. More details on the proposed project and alternatives are in Chapter 2.

1.3 Environmental Impact Statement Scope of Analysis

Ecology considered the potential impacts of the proposed project, as well as comments received during scoping, to determine the scope of the Draft EIS. The level of detail provided for resources in the sections and appendices of the EIS is intended to focus on probable significant adverse impacts, with some information provided on other impacts. As indicated in WAC 197.11.444, in order to focus the EIS on the significant issues, not all resources are detailed in separate sections of this EIS.

The portion of the proposed project that would occur within Oregon is limited to work within the existing substation and along existing transmission corridors. Therefore, most of the discussion in this EIS does not consider Oregon.

The introduction to Section 4 has more information on the study areas analyzed in this EIS and the types of impacts considered.

1.4 State Environmental Policy Act Process

The SEPA process is intended to ensure that environmental values are considered during decision-making actions by state and local agencies. The process helps agency decision-makers, applicants, and the public understand how the entire proposal will affect the environment. The environmental review process in SEPA is intended to work with other regulations and documents to provide a comprehensive review of a proposal. Ecology prepared this Draft EIS under SEPA requirements described in RCW Chapter 43.21C and WAC Chapter 197.11. Ecology issued a Determination of Significance on January 14, 2021, starting the EIS process.

FERC is developing a federal environmental assessment or an EIS to evaluate the proposed project under the National Environmental Policy Act requirements. The federal National Environmental Policy Act environmental assessment or EIS is separate from this SEPA EIS.

1.5 Environmental Impact Statement Organization

This EIS is organized to provide information in three ways. The Summary provides quick, high-level information on key findings and significant adverse impacts. The Draft EIS chapters provide information on the EIS impact analysis and findings. The appendices contain supplemental information about the EIS and EIS process, including the *Scoping Summary Report* and several resource analysis reports. The resource analysis reports include detailed methods and technical information about specific analytical topics that are summarized within the Draft EIS. For sections of this Draft EIS that have a related resource analysis report, the resource analysis report is the official technical documentation for this EIS and, if there is conflicting information between the Summary, Draft EIS chapters, or the resource analysis report, the resource analysis report is considered to be the controlling document. The Draft EIS is organized as follows:

- Publication and Contact Information, Cover Letter, and Fact Sheet
- Summary
- Draft EIS
  - Chapter 1: Introduction and Background
  - Chapter 2: Proposed Project Description and Alternatives
  - Chapter 3: Required Permits and Approvals
  - Chapter 4: Affected Environment, Potential Significant Impacts, and Mitigation Measures
  - Chapter 5: Climate Change
  - Chapter 6: Cumulative Impacts
  - Chapter 7: Consultation and Coordination
  - Chapter 8: List of Preparers and Contributors
  - Chapter 9: Distribution List
  - Chapter 10: References
- Appendices
  - Appendix A: Scoping Summary Report
  - Appendix B: Surface and Groundwater Hydrology Resource Analysis Report
  - Appendix C: Wetlands and Regulated Waters Resource Analysis Report
  - Appendix D: Air Quality and Greenhouse Gases Resource Analysis Report
  - Appendix E: Energy Resource Analysis Report
  - Appendix F: Aquatic Species and Habitats Resource Analysis Report
  - Appendix G: Terrestrial Species and Habitats Resource Analysis Report
  - Appendix H: Tribal Resources Analysis Report
  - Appendix I: Environmental Health Resource Analysis Report
  - Appendix J: Environmental Justice Report

2 Proposed Project Description and Alternatives

This section summarizes information provided by the Applicant about their proposed project. It also describes the No Action Alternative that was developed for the EIS and alternatives that were considered to be studied in the EIS.

2.1 Applicant Project Objectives

The Applicant's objective is to construct a pumped-storage hydropower facility along the Columbia River capable of generating 1,200 MW of electricity, which the Applicant has determined to be most appropriate for the proposed location and market conditions. The proposed project objective is based on the following criteria:

- **Reuse an Existing Industrial Site:** The proposed project would reuse part of the footprint of a previously developed industrial site.
- **Use an Existing Water Right and Water Intake:** The existing water right owned by KPUD would enable the proposed project to be built with no new water intake features and no new water right.
- **Be in Proximity to Complementary Energy Projects and Infrastructure:** The proposed project would be located near BPA transmission lines, the existing John Day Substation, and nearby wind farms, allowing potential interconnection to existing infrastructure while promoting alignment with nearby energy-related land uses.

2.2 Location

The proposed project area is in Klickitat County, Washington, approximately 8 miles southeast of the City of Goldendale, on John Day Dam Road. The project area encompasses 681.6 acres, as previously shown in Figure 1.1-1 in Chapter 1. The project area includes 621.9 acres of private lands primarily owned by NSC Smelter, LLC, and an existing utility right-of-way owned by BPA.

The upper reservoir and associated features would be located on the Columbia Hills adjacent to a high desert plateau above the Columbia River (upper plateau) at an elevation approximately 2,800 feet above sea level. The lower reservoir, underground powerhouse, access tunnel portal, and associated features would be located on a former floodplain plateau above the Columbia River (lower plateau) at an approximate elevation of 440 feet above sea level.

View from the Columbia Hills upper plateau, facing southeast toward the lower plateau, the Columbia River, John Day Dam, and Oregon

The lower reservoir area includes lands that were previously used as support areas for the CGA smelter (Figure 2.2-1). This facility was a primary aluminum reduction smelter that generally operated from 1969 to 2003 and was added to Ecology's Hazardous Sites List in 1990. The CGA smelter was capped and closed in 2005 in compliance with applicable environmental laws and is currently being managed under an MTCA Agreed Order. Investigation of contamination on the site and development of cleanup actions are

proceeding through a separate process. The Applicant is seeking a prospective purchaser consent decree to define the extent of cleanup actions needed for the portion of the site they propose to purchase for the lower reservoir construction. Section 4.10, Environmental Health, further discusses the cleanup activities that may be needed.

Project tunnels would be located between the upper and lower reservoirs for water conveyance, as well as between the lower reservoir and the underground powerhouse for power transmission and access to underground infrastructure. These tunnels would cross under SR 14, which is owned by the Washington State Department of Transportation (WSDOT). An existing access road that crosses Washington Department of Natural Resources (WDNR) lands would be used for accessing the upper reservoir. An existing private road would be used to access the lower reservoir area.

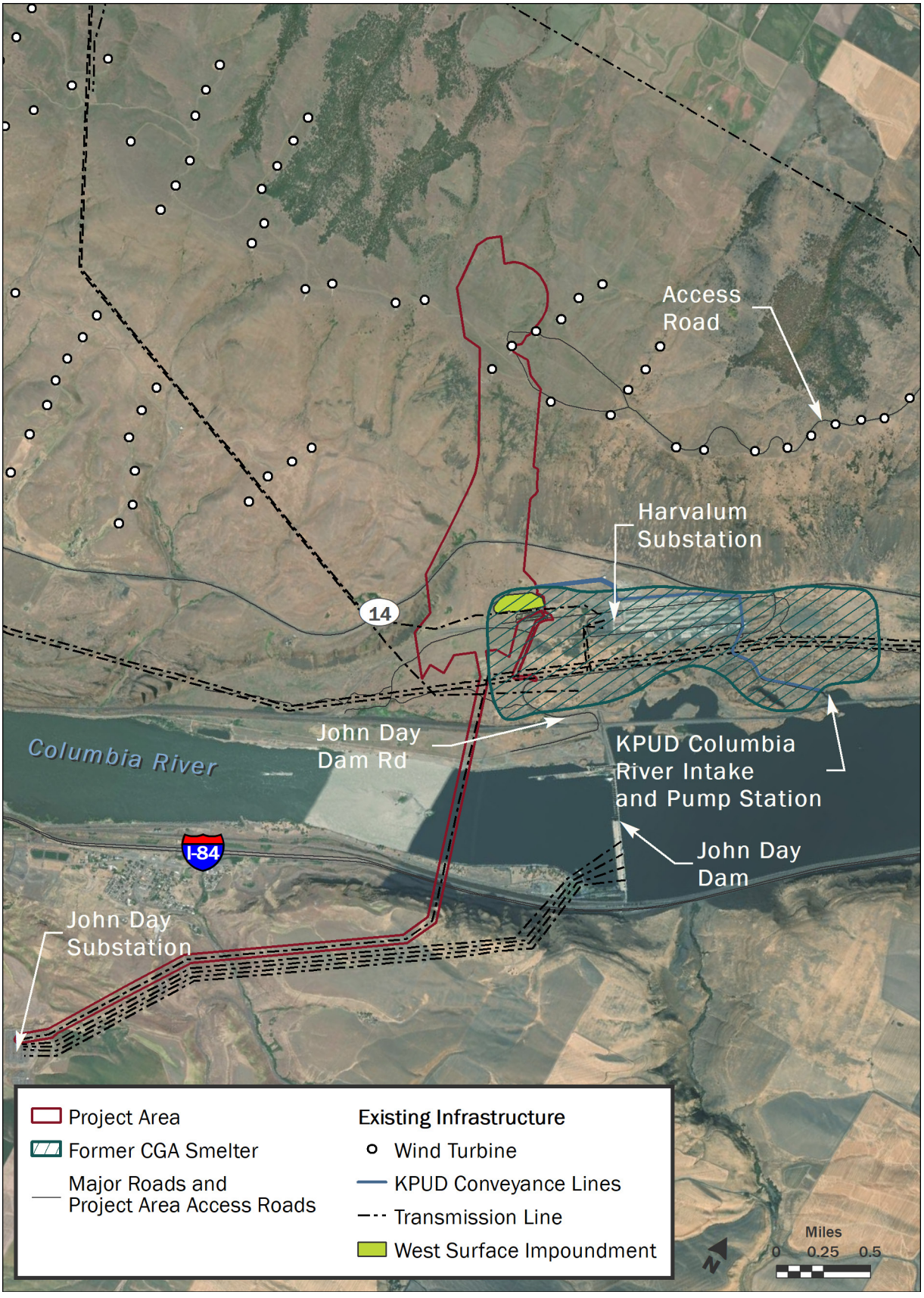
A proposed aboveground transmission line would connect from a proposed substation near the lower reservoir to an existing, available circuit on BPA transmission line structures within an existing utility right-of-way (Figure 2.2-1). The existing transmission lines aerially cross the Columbia River to the existing BPA John Day Substation in Sherman County, Oregon, near the City of Rufus.

View of a portion of the lower reservoir area (foreground), facing east toward the former CGA smelter and Harvalum Substation

View of the Columbia Hills ridge from SR 14, facing north

View facing northeast near the upper reservoir area

Figure 2.2 1
Existing Infrastructure at the Proposed Project Area



Data Source: FFP 2021a

2.2.1 Existing Facilities

Existing infrastructure in the project area includes private roads, power transmission lines, wind turbines owned by the Turlock Irrigation District, the Harvalum Substation, the John Day Substation, the West Surface Impoundment (WSI), and KPUD's water supply system (Figure 2.2-1). The Harvalum Substation is an existing electrical substation adjacent to the former CGA smelter and to the east of the WSI. The John Day Substation is an existing BPA-owned and operated electrical substation in Sherman County, Oregon. The John Day Substation connects to an existing BPA right-of-way and transmission corridor to the north. This existing transmission corridor spans the Columbia River and connects to the project area. These substations are not part of the proposed project.

A private road from its intersection with John Day Dam Road would be used to access the lower reservoir. A separate private road from its intersection with Hoctor Road would be used to access the upper reservoir; this access road crosses WDNR lands. KPUD and BPA power distribution lines are within the project area, supported by single-pole structures and H-frame wood towers.

A wind energy project owned by Turlock Irrigation District (operated as Tuolumne Wind Project Authority) is located directly adjacent to the upper reservoir proposed project area. One of their turbines is located within the project area aboveground, directly over the location of the proposed headrace tunnel, but is vertically separated from the project.

A portion of the lower reservoir would be located within the WSI, which is an area associated with the former CGA smelter. The impoundment has previously been determined as having non-hazardous and non-dangerous material (Ecology 2014). However, this area would be studied further prior to being excavated as part of the construction of the lower reservoir. Additional information about the WSI is in Section 4.10.

KPUD's industrial water conveyance system includes intake and pumping facilities off-stream from the Columbia River. The pump station is adjacent to the Lake Umatilla portion of the Columbia River just upstream of John Day Dam. The existing intake to the pump station draws water from the bottom of an infiltration gallery that consists of an excavated channel filled with clean gravel that prevents fish from becoming entrained. Water is supplied to the infiltration gallery from an intake pool that is physically separated from the main channel of the Columbia River by a rock and gravel-filled embankment to support the BNSF railroad. Water is drawn from the Columbia River to the intake pond, and then into the infiltration gallery, by seepage through the rock embankment (Rye Development 2021a). KPUD's existing system also includes buried piping to two water storage tanks, and a buried 30-inch-diameter steel fill conduit. The conduit extends from the storage tanks and terminates with a water service shut-off valve in a water supply service vault within the project area. KPUD's industrial water conveyance system is not a part of the proposed project and is not within the proposed project area, with the exception of the water supply service vault.

2.3 Proposed Project

The Applicant proposes to construct and operate a pumped-water energy storage system that would be used to release water from an upper reservoir downhill to a lower reservoir to generate up to 1,200 MW of electricity. At the beginning of an operation cycle, approximately 7,100 acre-feet of water would be pumped from the lower reservoir through the conveyance system to the upper reservoir. To generate power, water would be released from the upper reservoir and passed through three 400-MW variable speed, reversible pump-turbine units to the lower reservoir (FFP 2020a).

Power Generation Terminology

Acre-foot or acre-feet: The volume of water that would cover 1 acre of land to a depth of 1 foot. One acre-foot = 43,650 cubic feet.

Megawatt: A unit of electrical power equal to 1,000,000 watts. One MW = 1,000 kilowatts.

Reversible pump-turbine unit: This piece of mechanical equipment can be used to move water in either direction.

2.3.1 Proposed Project Facilities

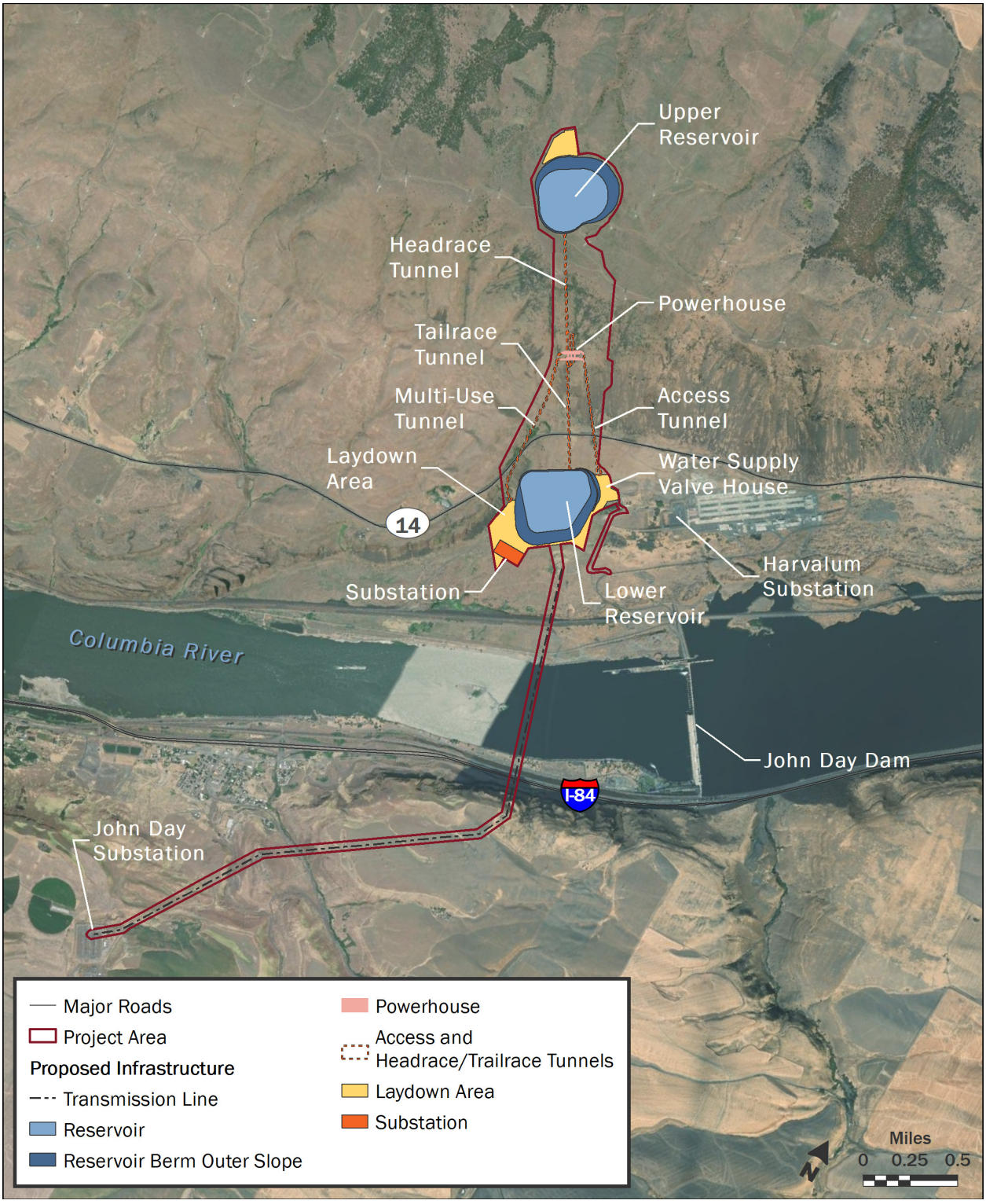
The pumped-storage hydropower facility would consist of two reservoirs located off-stream of the Columbia River. No rivers or streams would be dammed to create the reservoirs. The layout of the proposed project facilities is shown in Figure 2.3-1. The final arrangement of proposed project features would be based on required studies of topography, geology, hydrology, seismic hazard consideration, and functional requirements. The lower reservoir area is proposed to overlap with a portion of the former CGA smelter site.

Water for the proposed project would be drawn from the Columbia River under an existing permit that once served the former CGA smelter. The Applicant plans to purchase this water from KPUD, who holds the existing municipal water right. Proposed project plans call for the system's lower reservoir and conveyance piping to be filled once at the end of construction, and then periodic fills to recharge the system (i.e., make-up water) as needed to offset evaporative and leakage losses from the system.

The Applicant's proposed project includes the following facilities, which are described in Sections 2.3.1.1 through 2.3.1.4 and shown in Figure 2.3-1:

- Two reservoirs vertically separated by 2,400 feet of elevation
- An underground water conveyance tunnel and powerhouse
- An electrical substation/switchyard, along with transmission lines from an underground transformer gallery to the outdoor substation/switchyard
- A new aerial transmission line across the Columbia River, along existing transmission line corridors, connecting to BPA's existing John Day Substation
- Access tunnels and support structures

Figure 2.3 1
Proposed Project Configuration



Data Source: FFP 2021b

2.3.1.1 Reservoirs

Both the upper and lower reservoirs would be concrete-faced rockfill embankment dams. The reservoirs would be lined with concrete to reduce leakage, seepage, and evaporation, and the lower reservoir is anticipated to include a double liner system to further minimize any potential for leakage.

The upper reservoir would be 175 feet high, 8,000 feet long, with a surface area of about 61 acres and a capacity of 7,100 acre-feet. The top of the embankment of the upper reservoir would be at an elevation of 2,950 feet above mean sea level. The upper reservoir would include an ungated vertical intake structure with a hood at the top of the vertical shaft (Figure 2.3-2).

The lower reservoir would be approximately 205 feet high, 6,100 feet long, with a surface area of about 63 acres and a capacity of 7,100 acre-feet. The top of the embankment of the lower reservoir would be at an elevation of 590 feet above mean sea level. The lower reservoir would contain a horizontal intake structure, including vertical steel slide gates to allow isolation of the tailrace tunnel from the lower reservoir. A new water fill line will connect to the existing KPUD water supply service connection in a vault on the northeast side of the lower reservoir. Table 2.3-1 summarizes the elevations of the reservoirs, embankments, and corresponding height of different reservoir fill scenarios.

Project Components Terminology

Headrace/tailrace: The headrace is a channel or tunnel that carries water from a reservoir to a turbine, whereas a tailrace carries water away from the turbine.

Monitoring instrumentation: Instrumentation along the reservoir embankments would include movement monuments (to monitor movement), extensometers (to measure changes in length), and piezometers (to measure liquid pressure).

Freeboard: The vertical distance between the maximum reservoir water level and the top of the embankment dam (the crest).

Underground water conveyance tunnel: The tunnel through which water would be pumped between reservoirs.

Powerhouse: The powerhouse would contain the pump-turbine units used to pump water between reservoirs.

Transformer gallery: The transformer gallery would contain infrastructure used to tie into the existing electrical grid. The transformer gallery would then power the pump-turbine units and other infrastructure within the powerhouse.

Table 2.3-1
Reservoir and Embankment Elevations

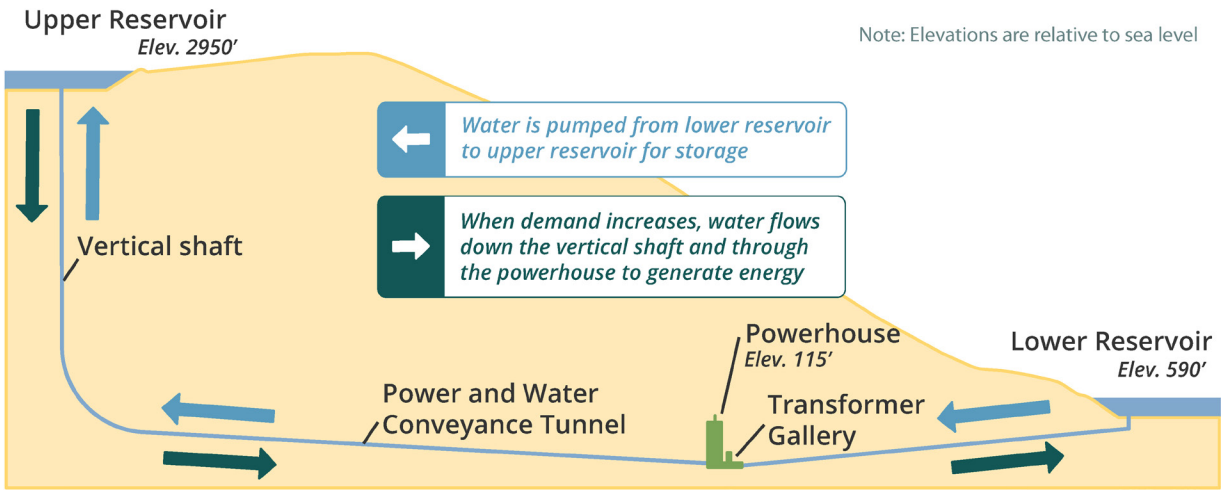
RESERVOIR	ELEVATION RELATIVE TO SEA LEVEL (FEET)				
	BOTTOM OF RESERVOIR	TOP OF RESERVOIR EMBANKMENT	NORMAL MINIMUM WATER LEVEL	APPROXIMATE NORMAL AVERAGE WATER LEVEL	APPROXIMATE MAXIMUM FLOOD WATER LEVEL
Upper	2,775	2,950	2,785	2,865	2,945
Lower	420	590	430	505	581

The embankments forming the upper and lower reservoirs would include instrumentation to continuously monitor the performance of the structures. Access along the toe of each embankment, or where the reservoir embankment meets the ground, would allow for periodic inspections and monitoring of equipment. Other features of the reservoirs such as low-level outlet size and location (if required), reservoir liner type, and freeboard will be determined by the Applicant during the final design stage.

2.3.1.2 *Underground Water Conveyance Tunnel and Powerhouse*

The proposed project would include the construction of an underground water conveyance system, designed to help move water between the upper and lower reservoir. Tunnels would be lined with concrete, steel, or both, and may include an impermeable synthetic liner to reduce leakage and seepage. The internal diameter of the water conveyance tunnels would range from 15 to 30 feet. The approximate arrangement of the proposed water conveyance tunnels and other underground infrastructure are shown in Figure 2.3-2.

Figure 2.3 2
Underground Water Conveyance Tunnel and Powerhouse



An underground powerhouse would be located between the upper and lower reservoirs. The powerhouse area would be approximately 450 feet long by 80 feet wide (0.83 acre) by 150 feet high and the cavern would contain three 400-MW reversible pump-turbine units and variable speed motor-generators.

Accessory electrical equipment will include transformers, control and communications equipment, starting equipment, main leads, breakers, switches, and current-limiting reactors. Other mechanical equipment will include a bridge crane, HVAC, cooling water, drainage, a compressed air system, and an emergency diesel generator.

2.3.1.3 *Electrical Substation/Switchyard and Transmission Lines*

A separate underground transformer gallery would be adjacent to the underground powerhouse (Figure 2.3-2). The transformer gallery would be approximately 350 feet long by 60 feet wide (0.48 acre) by 60 feet high. The transformer gallery would contain eighteen 115 kV intermediate step-up transformers. An approximately 1-mile-long 115 kV transmission line would be routed from the transformer gallery through a combined access and transmission tunnel to an outdoor 115/500 kV substation and switchyard in a 7.3-acre area near the lower reservoir.

From the substation, a 4-mile-long 500 kV aboveground transmission line would be routed within an existing utility right-of-way and an existing available circuit on BPA transmission line structures south over the Columbia River, occupying an existing vacant river crossing on the McNary-John Day double circuit, river-crossing tower. At BPA's existing John Day Substation, the tie-line would be terminated in an existing bay sharing a breaker with an existing line. The location, number of circuits, voltage, and configuration of the proposed project's interconnection with the regional electric utility network would be finalized by

the Applicant during the final design stage, in conjunction with the BPA transmission planning group. Based on BPA's 2019 Interconnection Feasibility Study for the proposed project, the John Day Substation is a feasible connection point for interconnection into BPA's transmission system (BPA 2019).

2.3.1.4 Access Tunnels and Support Structures

Two 30-foot-diameter horizontal tunnels (maximum 10% slope) for accessing the powerhouse and transformer gallery caverns would be constructed (see Figure 2.3-1). The primary access tunnel for construction and operation would be reached from a portal on the northwest side of the lower reservoir. A second multi-use tunnel (for both high-voltage power transmission and secondary/redundant access during construction and emergency egress and access during operations) would be reached from a portal on the southwest side of the lower reservoir near the outdoor substation/switchyard.

The proposed project would also include associated support structures and features, such as a maintenance building, shop, and security fencing. No new access roads are anticipated, and no upgrades are anticipated to be needed to existing public roads in order to facilitate construction and permanent access to the proposed project's facilities.

2.3.2 Construction

2.3.2.1 Construction Phases and Duration

Construction of the proposed project is anticipated to begin in mid-2025 and completion of commissioning and operation is anticipated in early 2030. Construction activities are anticipated to take approximately 5 years to complete (FFP 2020b). The overall project schedule and sequencing may be modified based on applicable regulatory permit processes and project final design details. If permitted, proposed project pre-construction activities are anticipated to begin in early 2023 and would last approximately 2 years. Table 2.3-2 summarizes the duration of each construction activity.

Table 2.3-2
Project Construction Phase Duration

PROJECT PHASE	ESTIMATED DURATION
Pre-construction Activities	
Establish site, access, and construction camp facilities	Q1 2023 – Q4 2023
Establish temporary power	Q2 2023 – Q2 2024
Establish construction water supply	Q2 2023 – Q2 2024
Construction	
Upper reservoir, dam, and intake	Q2 2025 – Q3 2029
• Vertical intake shaft	Q3 2026 – Q4 2028
Lower reservoir, dam, and intake	Q2 2025 – Q3 2027
Powerhouse complex	
• Civil works	Q2 2025 – Q4 2028
• Mechanical and electrical	Q2 2027 – Q1 2029
Conveyance tunnels	Q4 2025 – Q4 2027
Substation and interconnection	Q2 2025 – Q2 2027
Commissioning	Q4 2027 – Q1 2030

Note: Q1, Q2, Q3, and Q4 represent Quarters 1 through Quarter 4 of a calendar year.
Source: FFP 2021c

At the start of construction, various mobilization activities would take place. Temporary construction power, fencing, laydown areas for stockpiling excavated materials, and staging areas for construction equipment and material handling would be established. Excavation for the underground powerhouse, waterways, and reservoirs would begin once construction is mobilized. Construction of the tailrace conveyance tunnel and powerhouse access tunnel would start as soon as possible for construction schedule efficiencies. Construction activities would occur Monday through Friday between the hours of 7 a.m. and 6 p.m.

2.3.2.2 *Construction Methods*

Large construction equipment and vehicles would include drilling machines, borers, bulldozers, compactors, graders, large excavators, scrapers, cranes, loaders, concrete trucks, water trucks, pickup trucks, dump trucks, and miscellaneous material delivery by over-the-road semi-tractor trailers. Small construction equipment such as pumps, lifts, generators, welders, and lights would also be used. Two concrete batch plants would be constructed and used during the construction period. One concrete batch plant would be constructed within the upper reservoir laydown area, and one would be constructed within the lower reservoir laydown area. The upper reservoir concrete batch plant would have a maximum generation capacity of 70,000 tons per year and the lower reservoir concrete batch plant would have a maximum generation capacity of 130,000 tons per year (FFP 2021c).

Construction activities would include project area preparation, clearing, grading, and staging. Construction activities would also include explosive blasting for rock excavation for the reservoirs and powerhouse. Reservoir construction would include foundation excavation and treatment, and construction of the rock fill, concrete face, toe plinth (or cutoff wall at the base), and parapet wall. The reservoirs are assumed to require an average of 20 feet of foundation preparation. Construction in the lower reservoir area would include excavation within the WSI. Prior to excavation in that area, it would be required that the investigation of contamination on the site and development and approval of cleanup actions be completed.

The vertical shaft to the upper reservoir would be constructed using a raise-bore machine with supplemental conventional rock excavation to achieve necessary shaft diameters. Tunnels and the powerhouse cavern would be constructed using conventional tunneling techniques, including the use of a diesel-powered mining machine or drilling machines. Any soil or rock material resulting from the construction of the tunnels, shafts, or caverns would be hauled out by truck. Construction of the tunnels and the caverns for the powerhouse and transformer gallery would likely require tunnel or cavern supports immediately after excavation. Specifications for these supports will be developed by the Applicant during final design, based on detailed subsurface investigations.

Construction of the upper reservoir and associated improvements on the upper plateau would be completed using existing, informal private access roads for construction access. No new public roads or public transportation facility improvements would be required for the proposed project. Construction schedules and any temporary road closures would be coordinated with WSDOT and Klickitat County.

A new 5,600-foot-long alignment for both electrical distribution lines around the south side of the lower reservoir would require the relocation of five to six wooden H-frame towers and nine to ten single-pole structures. The voltages of the relocated lines would not be changed. Beyond excavation in the WSI and relocation of the H-frame towers and single-pole structures, no existing structures or facilities would be demolished.

2.3.2.3 *Excavation, Fill, and Grading*

Excavated material from reservoir construction areas would be reused during construction for embankment fill as much as possible. Within the lower reservoir part of the project footprint, there is documented contamination associated with the WSI and potential to encounter other contaminated soil and groundwater due to the area's history of industrial use. Excavated material would be tested based on MTCA standards to determine whether the material is suitable for use in the embankments. If the excavated material is unsuitable for embankment fill, it would be managed and disposed of in accordance with state solid waste and dangerous waste standards and per the proposed project's Cleanup Action Plan, to be prepared under a prospective purchaser consent decree or other legal agreement. If sufficient quantities of suitable fill materials are not available in the project area, an off-site location(s) for embankment fill material would be identified. As facility design details are refined, sources and volumes of potential fill to be brought to the site would be determined. All fill brought to the site would be suitable for its intended use and would be delivered to the site in accordance with best management practices (BMPs) and a Klickitat County-approved transportation plan.

Preliminary estimates of cut and fill volumes associated with construction of the proposed project are provided in Table 2.3-3. Cut and fill volumes for both reservoirs would be balanced and would equate to approximately 12 million cubic yards. Other features of the proposed project that would require excavation, fill, or grading include (but are not limited to) underground tunnels, substation and switchyard construction, utility infrastructure tie-ins, internal access roads, temporary construction laydown and parking areas, and construction access road extensions. Preliminary estimates indicate that approximately 1 million cubic yards of fill would be needed. Leftover fill from powerhouse cavern and transformer gallery excavation could be re-used on site, if deemed suitable.

Table 2.3-3
Estimated Excavation and Fill Volumes for Reservoirs, Underground Powerhouse, and Transformer Gallery

PROJECT FEATURE	EXCAVATION VOLUME (CUBIC YARDS)	FILL VOLUME (CUBIC YARDS)
Powerhouse cavern	200,000	Not applicable
Transformer gallery	46,700	Not applicable
Lower reservoir embankment	4,000,000	7,000,000
Upper reservoir embankment	8,000,000	5,000,000

2.3.2.4 *Initial Water Fill*

An estimated volume of 7,640 acre-feet of water will be required to initially fill the project facilities (FFP 2020a). Water for the initial fill would be purchased from KPUD using a KPUD-owned conveyance system and existing water right. This water supply would be sourced from KPUD's existing intake and pump station, off-stream of the Columbia River (see Section 2.2.1). Water would be conveyed through a buried 2.5-foot-diameter water fill line leading from a shut-off and throttling valve within a water supply vault owned by KPUD to an outlet structure within the lower reservoir.

It is assumed that the initial fill would be completed over 6.5 months. The timing of the initial fill would depend on the timing of construction activities, such as the lower reservoir construction and the completion of the reservoir fill pipeline to the lower reservoir. When the powerhouse, conveyance tunnels, and upper reservoir are complete, the conveyances and upper reservoir would be slowly filled using small pumps sufficient to commission the plant. The initial fill of the system would occur near the end of the

construction period (likely between October to March). The proposed project would be commissioned during the fifth year of construction.

2.3.3 Proposed Project Operation

The FERC hydropower license that would be required for the proposed project would authorize construction and operation for a term of up to 50 years. As shown in Table 2.3-2, construction is anticipated to take approximately 5 years; thus, it is anticipated that the FERC license would cover approximately 45 years of operation once construction is complete.

The proposed project is designed to generate electricity for up to 12 hours a day, up to a maximum of 1,200 MW and a minimum of 100 MW. Pumping water from the lower reservoir to the upper reservoir at the beginning of an operation cycle would take approximately 15 hours. Project operation can alternate between pumping and generating modes quickly and for different lengths of time to respond to market needs, and the operating cycle of pumping and generating would be dictated by market demand (FFP 2020a). The estimated annual power generation if the project was generating power for 8 hours a day, 7 days a week would be 3,500 gigawatt-hours.

The volume of water in the system is estimated to be 7,640 acre-feet, which includes the 7,100 acre-foot operating volume for the lower reservoir, water that will remain in the upper and lower reservoirs beyond the operating volume, and the volume that will fill the water conveyance tunnels (FFP 2020a). It is estimated that the proposed project would require 360 acre-feet of water each year to replenish water lost through evaporation. The periodic refill (make-up) water would also be purchased from KPUD using the KPUD-owned conveyance system and existing water right.

2.4 No Action Alternative

The No Action Alternative represents the most likely future conditions if the proposed project is not constructed. Under the No Action Alternative, none of the proposed project facilities would be constructed. Investigation of contamination on the cleanup site and development of cleanup actions would continue through a separate process. KPUD would continue to hold the existing water right, which may be held in trust or sold to other purchasers of water. The wind energy project and other existing energy infrastructure would continue to be operated. The analysis for the No Action Alternative is based on the expected conditions in 2030, which is the year that construction of the Applicant's proposed project would be expected to be completed.

2.5 Determining Environmental Impact Statement Alternatives

SEPA requires lead agencies to evaluate reasonable alternatives to the proposed project (WAC 197.11.786, 197.11.440(5)). Reasonable alternatives are defined as "actions that could feasibly attain or approximate a proposal's objectives, but at a lower environmental cost or decreased level of environmental degradation" (WAC 197.11.440). Per WAC 197.11.440(5)(d), when a proposal is for a private project on a specific site, the lead agency shall be required to evaluate only the No Action Alternative plus other reasonable alternatives for achieving the proposal's objective on the same site. As such, alternative locations for the proposed project were not evaluated as alternatives for the EIS. To identify alternatives, Ecology considered scoping comments regarding alternatives to be studied in the EIS and the Applicant's FERC FLA (Anchor QEA 2021; FFP 2020a).

Ecology evaluated potential alternatives to determine whether they met the proposal's objective, using the following criteria:

- Do they feasibly obtain or approximate the proposal's objective and associated criteria of generating 1,200 MW of electricity while reusing an existing industrial site, using an existing water right and water intake, and providing proximity to complementary energy projects and infrastructure?
- Do they provide a lower environmental cost or decreased level of environmental degradation than the proposed project?

2.5.1 Alternatives Considered but Eliminated

The following alternatives were considered in screening, but are not evaluated further in this EIS:

- **Pumps at Existing Dams and Reservoirs**: Installing pumps at existing dams and reservoirs instead of constructing new reservoirs was suggested in scoping comments. This could result in a lesser environmental impact compared to the proposed project. However, no specific suggestions were provided for such an alternative's location, design, or the circumstances of existing water rights. As such, this alternative does not meet the criteria to attain the proposal's objectives.

- **Other Decarbonized Energy Storage Technologies**: Other renewable/decarbonized energy storage technologies were suggested in scoping comments, such as the following: stacked blocks, liquid air, underground compressed air, flow battery storage, and solar and lithium-ion battery storage. None of these alternative energies meet the criteria to attain the proposal's objectives.

- **On-site Design Alternatives:** Several on-site alternatives from the Applicant's FERC FLA were considered. Much like the proposed project, these alternatives would reuse the industrial site currently owned by NSC Smelter, LLC. These alternatives would also reuse an existing water right and water intake and would be in close proximity to available transmission infrastructure. The following alternatives were considered:
  - **Applicant's Previous Design Alternative:** A previous design from the Applicant included two upper reservoirs interconnected with a single high-pressure water conveyance shaft and tunnel, an underground powerhouse with appropriate access tunnels, a low-pressure tunnel, and a lower reservoir. The two upper reservoirs would provide a combined active storage capacity of 11,800 acre-feet. The lower reservoir would provide a total active storage of 11,800 acre-feet. Given the larger construction and operational reservoir footprints of this alternative, the environmental impacts would be greater than those of the proposed project.
  - **11,800 Acre-Foot Reservoir Alternative:** This alternative would use an increased storage size as compared to the proposed project, providing active storage of 11,800 acre-feet between two reservoirs. This design alternative would use four 300-MW generator units, allowing for approximately 20 hours of continuous run time at full generating output of approximately 1,200 MW. Both reservoirs would be built at the same elevations as those in the proposed project but would be wider, providing more active storage capacity. Given the larger construction and operational reservoir footprints of this alternative, the environmental impacts would be greater than those of the proposed project.
  - **4,800 Acre-Foot Reservoir Alternative:** This alternative would utilize a smaller storage size than the proposed project, providing active storage of 4,800 acre-feet between two reservoirs. This design alternative would use four 300-MW generator units, allowing for approximately 8 hours of continuous run time at full generating output of approximately 1,200 MW. Both reservoirs would be built at the same elevations as those in the proposed project but would be

built smaller, providing less active storage capacity. The size and design of this alternative would create economic and power generation inefficiencies. The cost of energy generation would be excessive due to the spread over four turbines and the 8-hour continuous run time would be less compatible with the anticipated needs of the electrical grid.

2.5.2 Alternatives Screening Conclusion

As previously mentioned, per WAC 197.11.440(5)(d), private projects on a specific site only require an evaluation of the proposal and the No Action Alternative, in addition to other reasonable alternatives for achieving a proposal's objective on the same site. Based on the evaluation summary above, Ecology has determined that there are no other reasonable alternatives capable of achieving the purpose and objectives of this proposal at this location. Therefore, this EIS analyzes the No Action Alternative and the proposed project.

The proposed project would meet the objective and associated criteria. It would include a single upper reservoir, which would reduce the overall volume of earthwork and eliminate redundant project features, resulting in lower construction costs and reduced environmental impacts. The proposed project would provide an active storage size of 7,100 acre-feet of water, enabling the facility to provide energy storage capacity for both peak hour and approximately 12 hours of 1,200 MW of power generation. Additionally, this alternative would use three 400 MW generator units, which would result in greater stability at a reduced energy consumption per MW when compared to units needed in other alternatives considered.

3 Required Permits and Approvals

Potentially required permits, licenses, and approvals for the proposed project would include the following.

3.1 Federal

- **Hydroelectric License (FERC):** Under the regulatory authority of the Federal Power Act (U.S. Code Chapter 12), FERC is responsible for issuing licenses for new non-federal hydropower projects on navigable waterways or federal lands, or connected to the interstate electric grid. The proposed project would require a FERC Hydroelectric License to authorize construction and operation for a term of 30 to 50 years. This authorization guides design and construction in accordance with required FERC dam safety protocols for the dams, powerhouses, and other structures associated with operation and generation of electricity through hydropower. The license process includes preparation of an emergency action plan, supporting technical information document, and potential failure mode analysis for the proposed reservoirs and development and implementation of a surveillance and monitoring plan to be implemented during operation. The Applicant may, but is not required to, obtain from FERC a preliminary permit that maintains priority of application for license while the requisite engineering studies are underway and the license application is prepared. An application was submitted by the Applicant in June 2020 and is currently being considered by FERC as FERC Project No. 14861.
- **National Environmental Policy Act (FERC):** As part of the licensing process, FERC must prepare National Environmental Policy Act documentation, evaluating the potential impacts of the proposed project. As described in Chapter 2 of this EIS, the National Environmental Policy Act process will occur separately from the SEPA process described in this EIS.
- **Endangered Species Act (FERC):** Section 7 of the Endangered Species Act requires federal agencies to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or result in the destruction or adverse modification of the critical habitat of such species. FERC, in consultation with U.S. Fish and Wildlife Service (USFWS) and National Oceanic and Atmospheric Administration Fisheries, would evaluate the effects on listed and proposed species and critical habitats and require compensatory mitigation for unavoidable impacts.
- **National Historic Preservation Act (FERC):** Section 106 of the National Historic Preservation Act requires federal agencies to consider the effects of the proposed project on historic properties as part of the federal permitting process. Historic properties include sites, buildings and structures, and Traditional Cultural Properties (TCPs) that are eligible for inclusion in the National Register of Historic Places (NRHP). FERC would make a determination of adverse effect on historic properties in consultation with interested and affected Tribes, the State Historic Preservation Officer at the Washington State Department of Archaeology and Historic Preservation, the Oregon State Historic Preservation Officer if cultural resources extend into Oregon, and other interested parties.
- **Large Generation Interconnection Agreement (BPA):** BPA requires generators of electricity greater than 20 MW who wish to interconnect to the Federal Columbia River Transmission System to follow the procedures laid out in the Large Generator Interconnection Procedures (BPA 2021).
- **Federal Explosives License/Permit (Federal Bureau of Alcohol, Tobacco, and Firearms):** A permit would be required for blasting activities during construction.

- **Eagle Incidental Take Permit (USFWS):** This permit is needed if take of golden eagles cannot practicably be avoided in the course of an otherwise lawful activity. Most take authorized under this permit is in the form of disturbance (Code of Federal Regulations [CFR] 50.22.26, USFWS Form 3-200-71). Disturbance from the proposed project would be most likely to occur during heavy equipment operation or drilling and blasting related to construction (FFP 2020c).

- **Section 404 Clean Water Act Permit (USACE):** Construction and operation of the proposed project would affect wetlands and streams, which are waters of the United States. Department of the Army authorization from the U.S. Army Corps of Engineers (USACE) under Section 404 of the Clean Water Act would be required. As part of this approval, consultations for the Endangered Species Act and Section 106 of the National Historic Preservation Act would be required.

3.2 Washington State

- **Clean Water Act Section 401 Water Quality Certification (Ecology):** A Section 401 Water Quality Certification from Ecology will be required. This certification is required for any project that needs a federal permit or license that may result in any discharge into water of the United States. It is intended to provide reasonable assurance that the Applicant's proposed project will comply with state water quality standards and other requirements for protecting aquatic resources. The Section 401 Water Quality Certification would cover both construction and operation of the proposed project. Conditions from the Section 401 Water Quality Certification would become part of the new FERC license and the USACE permit.

- **Section 402 Clean Water Act National Pollutant Discharge Elimination System (NPDES) Construction Stormwater General Permit (Ecology):** The construction of the proposed project would require a construction stormwater permit. As part of the NPDES permit process, stormwater and wastewater generated on the proposed project area would be evaluated and characterized, after which the specific language and type of NPDES would be determined.

- **Section 402 Clean Water Act NPDES Industrial Stormwater Permit (Ecology):** The proposed project would result in releases of water that require an industrial stormwater permit. All wastewater and stormwater generated from the proposed project and potentially discharged would be evaluated and characterized by the state. Once the water to be discharged has been accurately evaluated and characterized by the state, the specific standards for water discharged from the project area would be defined and the type of NPDES permit would be determined and issued.

- **NPDES Construction Stormwater General Permit with Administrative Order for Proposed Cleanup Action (Ecology):** The NPDES Construction Stormwater General Permit would be required because construction of the proposed project would result in more than 1 acre of ground disturbance and involve stormwater discharges to surface waters. The NPDES permits would include conditions requiring a Stormwater Pollution Prevention Plan and appropriate erosion, sediment, and pollution control measures. Because construction of the proposed lower reservoir would involve excavation and handling of contaminated materials from a portion of the former CGA smelter cleanup site, Ecology would issue a site-specific Administrative Order on the Construction Stormwater General Permit for the proposed project. The Construction Stormwater General Permit with Administrative Order would include conditions requiring the permittee to prepare a Stormwater Pollution Prevention Plan and implement appropriate materials management (including dewatering water); erosion, sediment, and pollution control measures; and monitoring and reporting for the duration of construction.

- **NPDES Sand and Gravel General Permit (Ecology)**: The NPDES Sand and Gravel permit is required for operations that include sand and gravel operations, concrete batch plants, or asphalt batch plants. The NPDES Sand and Gravel General Permit would be required for operation of the portable concrete batch plant associated with the proposed project.

- **Air Quality Permits (Ecology Central Region Office – Air Quality Program)**: Ecology issues air quality permits for counties that do not have a local clean air agency, including Klickitat County. The project would require a Notice of Construction (NOC) air quality permit. NOC permits are required to construct or modify any building, structure, facility, or installation that would result in emissions from a new source or an increase in emissions from an existing source.

  - **Construction Phase NOC Permit or Compliance with WAC 173.400.036 Portable Source Relocation Procedures (Ecology Central Region Office):** An air permit is required for construction phase portable stationary sources. "Portable source" means a type of stationary source that emits air contaminants only while at a fixed location, but which is capable of being transported to various locations. This applies to the construction phase concrete batch plants, stationary generators, and crushing and screening equipment.

  - **Operation Phase NOC Permit (Ecology Central Region Office):** Per the provisions of WACs 173.400.110 and 173.460.040, an air permit is required for operation phase emergency generator emissions and portable equipment.

- **Washington State Explosives License (Department of Labor and Industries):** This permit would be required for blasting with explosives.

- **Reservoir Permit (Ecology)**: Reservoir permits are required when filling impoundments that will retain 10 or more acre-feet of water. A reservoir permit under RCW 90.03.370 would be needed to construct and operate the proposed project and would allow the Applicant to fill the reservoir once a year, unless otherwise specified by the permit.

- **Prospective Purchaser Consent Decree (Ecology)**: A 1994 amendment to the MTCA allows the Washington Attorney General and Ecology to enter into settlements with an applicant not currently liable for a remedial action at a facility who proposes to purchase, redevelop, or reuse the facility (Ecology 1994). The intent of these settlements is to demonstrate how the agreement will expedite cleanup of a site that would otherwise not occur or would occur more slowly without the agreement. It is anticipated the Applicant will enter into a prospective purchaser consent decree for the site.

- **Scientific Collection Permit (Washington Department of Fish and Wildlife [WDFW]):** A scientific collection permit is required to salvage, move, or remove fish and wildlife species (including avian nests and eggs) for research, construction, and other purposes (RCW 77.32.240, WAC 220.200.150, and WAC 220.450.030).

- **Hydraulic Project Approval (WDFW):** The proposed project would use, divert, obstruct, and change the natural flow and bed of freshwaters of the state and therefore would require a Hydraulic Project Approval from WDFW under the state's hydraulic code rules (WAC 220.660). The Hydraulic Project Approval would include conditions intended to minimize impacts on instream and riparian habitat and functions.

- **Washington State Water Pollution Control Law Administrative Order (Ecology):** The proposed project would result in both the temporary and permanent placement of fill material into wetlands and streams (waters of the state) that may not be regulated as waters of the United States under

Section 404 of the Clean Water Act. Impacts to wetlands or streams outside of federal jurisdiction are authorized through administrative orders under the state Water Pollution Control Act.

- **Permit Pursuant to Washington Energy Code (Washington State Building Code Council):** A permit is required to ensure registration with the state and compliance with the provisions of WAC 51.11C.

3.3 Local and Regional

- **Potential Critical Areas Review (Klickitat County):** Critical areas review may be required because the proposed project is within, abutting, or likely to adversely affect a critical area or buffer.
- **Potential Building Permit (Klickitat County):** A building permit may be required for activities to construct, enlarge, alter, repair, move, demolish, or change the occupancy of a building or structure.
- **Potential Fill and Grade Permit (Klickitat County):** A permit could be required for filling and grading necessary to construct the proposed project.
- **Potential Floodplain Development Permit (Klickitat County):** A flood hazard zone permit may be required for any construction or development that takes place within an area of special flood hazard.
- **Potential Zoning Conditional Use Permit (Klickitat County):** The current zoning districts do not include utility operations as a permitted use but could be accepted as a permitted conditional use.

4 Affected Environment, Potential Significant Impacts, and Mitigation Measures

The sections in this chapter summarize the affected environment, potential significant adverse impacts, and mitigation measures for each resource considered. The following paragraphs summarize the general approach that was used for the analyses for this chapter, with key terms highlighted and explained.

The **affected environment** is the condition within the study area for each resource, before any construction begins. The **study area**—or the area of focused analysis for a resource—is defined in each section based on where effects are most likely. For some resources, the study area may extend farther to determine the incremental impacts to the resource within a larger community or landscape.

The sections in this chapter discuss probable impacts on the resources from the proposed project and No Action Alternative. The EIS focuses on **significant adverse impacts**, with some information provided on less severe impacts. "Adverse" means an impact would have a negative change in the condition of the resource. A determination of significance involves consideration of both the intensity of the impact (magnitude and duration) and the context of the impact, which can vary with the setting and existing conditions for a particular resource. For each of the sections in this chapter, impacts were evaluated relative to the direct and indirect effects of construction and operation of the proposed project and the No Action Alternative.

Impacts

Temporary or **short-term** effects would only occur for a limited time during construction or operation. Temporary impacts can reoccur at intervals over time.

Long-term effects would result in **permanent** changes once they occur or would occur continuously over the period of analysis.

Direct impacts would occur as the result of, and at the same time and place as, an aspect or activity related to construction or operation.

Indirect impacts are those that would occur later in time or farther in distance, but are attributable to aspects or activities of the proposed project.

The sections in this chapter also consider **mitigation measures** that could further avoid, minimize, reduce, or compensate for the identified impact. Mitigation measures considered in this EIS include those proposed by the Applicant as well as those proposed to date by state agencies. In some cases, the mitigation measures may reduce adverse impacts below the level of significance. In other cases, mitigation measures may reduce, but not completely eliminate, the significant adverse impact. In that case, the section would identify the **significant and unavoidable adverse impact** remaining after consideration of mitigation.

The analysis of each resource was based on incorporation of best available existing information, including the following, as appropriate:

- Information provided by the Applicant, including documents from the FERC license process, technical studies, preliminary design documents and mitigation measures, and permit application materials
- Existing studies, quantitative modeling, reports, and regulatory findings relevant to the study area
- Information received through the scoping process (see Appendix A)
- Information from Tribal cultural and natural resources staff (see Section 7.2)
- Expertise of state agency staff relevant to specific resources (see Section 7.3)

Appendices B through J contain **resource analysis reports** with detailed information about some of the resources that are summarized within this chapter. For sections that have related resource analysis reports, the section in this chapter is intended to be a summary and reference to the corresponding report(s). In those cases, the resource analysis report is the official technical documentation for this EIS.

Other sections in this chapter do not have a corresponding resource analysis report in the appendices, and may include a more detailed discussion within the section of how impacts were evaluated and the findings of the analyses.

There are other factors that influence the effects on resources, and which could change the determinations of significant adverse impact, including the following:

- The influence of **climate change** could alter the impacts on a resource when cumulatively considered with the proposed project. A qualitative assessment of impacts with climate change, relative to the resource areas, is provided in Chapter 5.
- Separate from the direct and indirect effects considered in the sections of this chapter, **cumulative impacts** are effects that would result from the incremental addition of the proposed project to the impacts from past, present, and reasonably foreseeable future actions. These effects are evaluated in Chapter 6 to determine whether cumulative impacts could result from individually minor, but collectively significant, effects that occur over time with other actions.

4.1 Soils and Geology

Geology is the study of the earth, the materials that make it up, their structure, and the processes that act upon them such as earthquakes, landslides, and erosion. These processes affect water quality, people, cultural resources, and aquatic and terrestrial species and habitats. This section describes the following key features related to geologic and soil resources:

- Geology
- Soils
- Topography
- Unique physical features
- Erosion or accretion (i.e., sediment movement and accumulation)
- Geological and seismic hazards

Groundwater is addressed in Section 4.2 and the *Surface and Groundwater Hydrology Resource Analysis Report* (Aspect Consulting 2022), in Appendix B.

The study area for geology and soils includes both aboveground and belowground components (see Figure 4.1-2 in the next section). Aboveground, the study area encompasses the limits of the proposed project, plus a 250-foot buffer to capture potential impacts on adjacent geologic and soil resources. The aboveground study area includes the footprints of the upper and lower reservoirs, tunnel portals, and all proposed access, laydown, and parking areas required to construct the proposed project. It also includes the steep bluff between the proposed reservoirs where little to no aboveground work would occur. Belowground, the study area extends to the depth of the proposed construction work and includes the footprints of the upper and lower reservoirs, head- and tailrace tunnels and their associated manifolds, the powerhouse and transformer gallery, and the main and multi-use tunnels.

Key Findings of the Geology and Soils Analysis

The analysis found the proposed project would have **no significant and unavoidable adverse impacts** related to geology and soils.

Construction would replace approximately 280 acres of soils with project elements. In other areas, construction would also remove vegetation and expose soils to increased potential for erosion.

There is uncertainty related to the geologic conditions, but there is a possibility that construction could moderately increase geologic and seismic hazards, including the potential for landslides.

During proposed project operations, a local or regional earthquake could cause liquefaction in the vicinity of the lower reservoir, potentially resulting in damage to the reservoir embankment or other project elements. Although local faults are unlikely to produce earthquakes, the study area is within the moderate shaking zone for a Cascadia Subduction Zone earthquake.

Mitigation is not required to reduce any significant impacts, but additional geotechnical studies, sediment and erosion control plans, implementation of BMPs, and design updates are proposed to further reduce potential impacts.

The following sections describe the geologic resources of the study area and surrounding area including the geologic setting, regional and local geology, geologic structures, and soils. Most of the information contained in these sections was obtained from the Applicant's Exhibit E, Environmental Report, of their FERC FLA (FFP 2020a).

Geologic Setting

The proposed project is within the Columbia Plateau Physiographic Province (Columbia Plateau; Figure 4.1-1), which covers approximately 63,000 square miles (Shannon & Wilson 2002; FFP 2020a). The Columbia Plateau consists of a wide, arid lowland area that occupies much of the southeastern and south-central portions of Washington State and extends across portions of Oregon and Idaho (Figure 4.1-1; WDNR 2021a). The region is generally characterized by steep river canyons, extensive plateaus, and in places, tall sinuous ridges (WDNR 2021a). To the west of the Columbia Plateau and the study area is the Cascade Range of mountains. The Columbia Plateau slopes gently toward the Columbia River with the lowest elevations typically occurring within a former floodplain plateau along the river (Shannon & Wilson 2002).

Geology Terminology

Physiographic Province: A region having a particular pattern of relief features or landforms that differs significantly from that of adjacent regions

Folds: Bending of rock layers caused by compression

Faults: Deep cracks or fractures caused by the movement of rock during earthquakes

Anticline: A geologic fold in which the fold's two limbs dip away from each other.

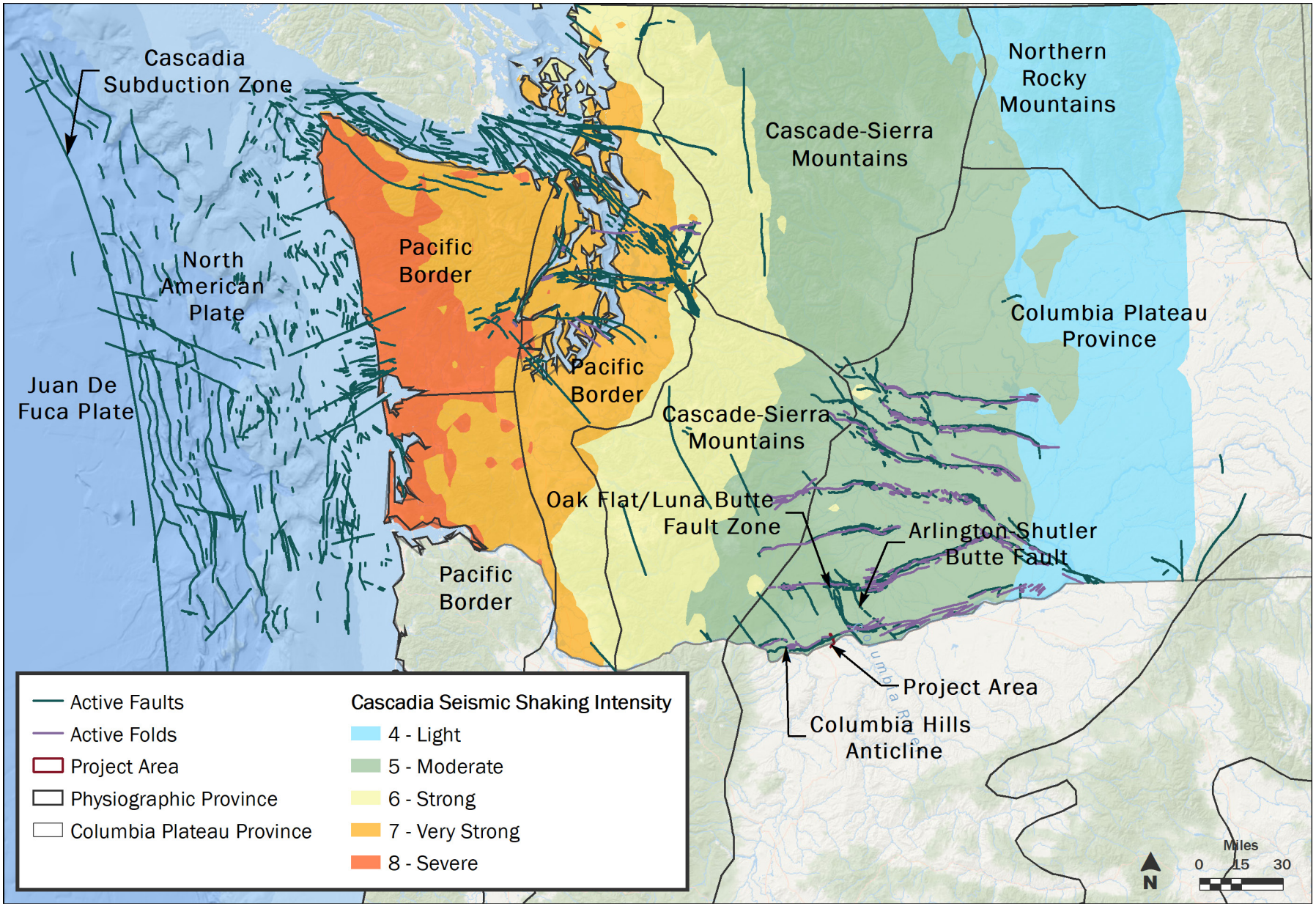
Syncline: A geologic fold in which the fold's two limbs dip toward each other.

The underlying rocks of the Columbia Plateau are primarily accumulations of successive lava flows from volcanic eruptions that occurred during the middle Miocene epoch (23.03 to 5.332 million years ago) from vents along the Washington-Idaho border (Shannon & Wilson 2002; FFP 2020a). The basalt rock formed by those flows, which is collectively known as the Columbia River Basalt Group, is several thousand feet thick and extends throughout most of the Columbia Plateau, including the study area. In many places, sedimentary deposits (e.g., sandstone and siltstone) of variable thickness are present between the basalt flows.

The study area is in the Yakima Fold and Thrust Belt subprovince of Columbia Plateau. This subprovince is a region of giant folds and faults in the underlying rock formations that were created by regional compression and uplift beginning in the Pliocene epoch (5.4 to 2.4 million years ago) and continuing through to present day (WDNR 2021a). Those processes resulted in the development of geologic structures known as anticlines and synclines (see definitions in the box on this page). In this region, anticlines typically form the ridges and synclines typically form the valleys (WDNR 2021a). Over time, this folding has caused rock formations to crack and break, creating a series of fractures or faults along which movement can occur. The general locations of some of the known folds and faults in the study area are shown in Figure 4.1-2. Those features are further discussed in the Geologic Structures portion of this section.

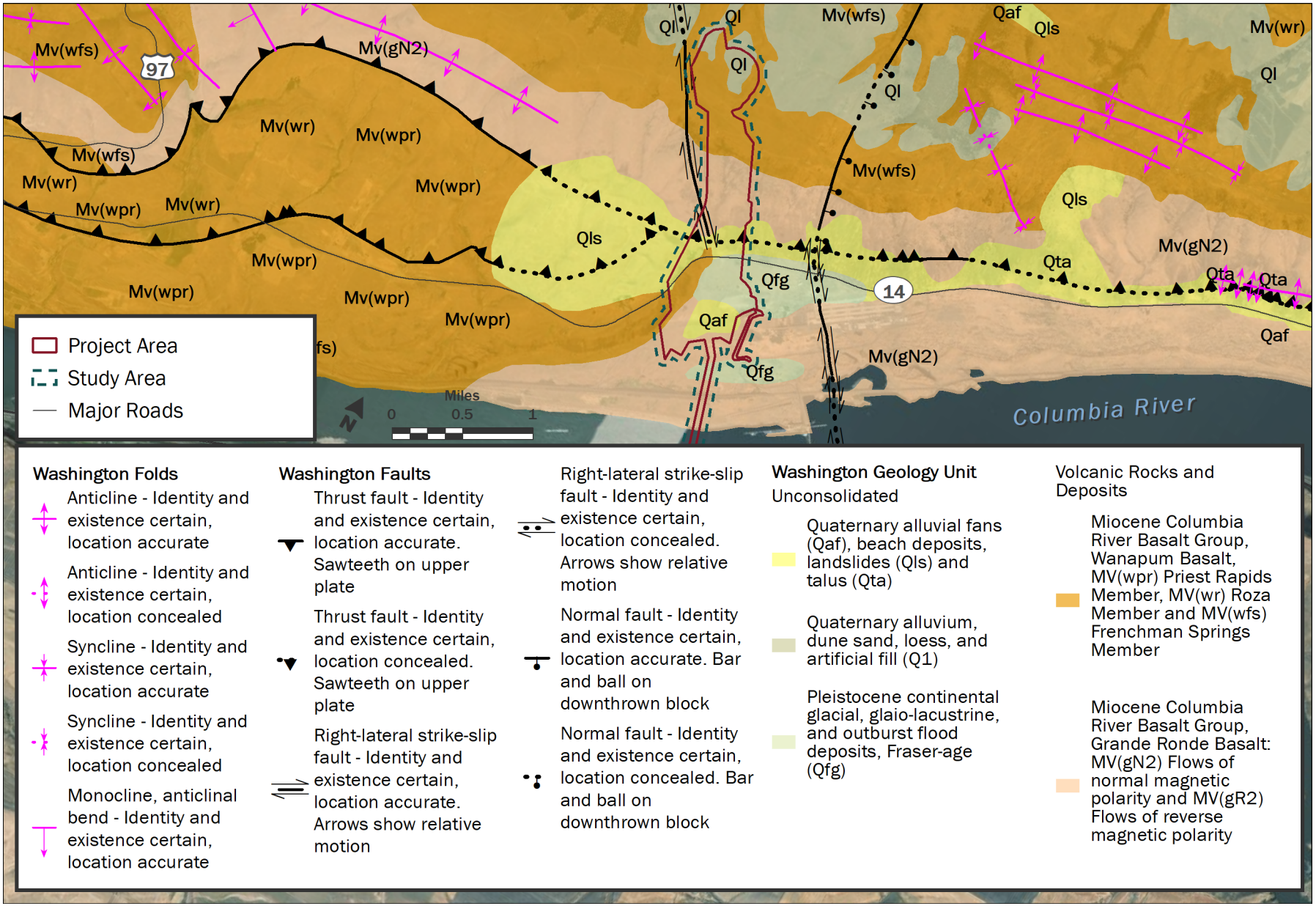
The multiple folds, faults, and fractures created a landscape that allowed stream erosion to cut deeply through and across sections of the underlying basalt rock (FFP 2020a). Such processes created many of the steep river canyons and plateaus that characterize this region. As the continental ice sheet advanced and retreated (2.6 million to 11,700 years ago), massive floods (the Spokane/Lake Missoula Floods) spread across the region, forming the Columbia River Gorge west of the study area (FFP 2020a). The floods scoured materials from upland areas and deposited sediments in local basins and along the course of the Columbia River (FFP 2020a).

Figure 4.1 1
Regional Geologic Setting



Data Sources: FFP 2021a; WDNR 2021b, 2021c; USGS 2021b

Figure 4.1 2
Geologic Units and Features of the Study Area and Vicinity



Washington Folds

- Anticline - Identity and existence certain, location accurate
- Anticline - Identity and existence certain, location concealed
- Syncline - Identity and existence certain, location accurate
- Syncline - Identity and existence certain, location concealed
- Monocline, anticlinal bend - Identity and existence certain, location accurate

Washington Faults

- Thrust fault - Identity and existence certain, location accurate. Sawteeth on upper plate
- Thrust fault - Identity and existence certain, location concealed. Sawteeth on upper plate
- Right-lateral strike-slip fault - Identity and existence certain, location accurate. Arrows show relative motion
- Right-lateral strike-slip fault - Identity and existence certain, location concealed. Arrows show relative motion
- Normal fault - Identity and existence certain, location accurate. Bar and ball on downthrown block
- Normal fault - Identity and existence certain, location concealed. Bar and ball on downthrown block

Washington Geology Unit

Unconsolidated

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

Volcanic Rocks and Deposits

- 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

Data Source: FFP 2021a

Regional and Local Geology

The geologic units and features in the study area and surrounding region are shown in Figure 4.1-2. These units are generally divided into two main types (FFP 2020a): volcanic rocks and deposits, and unconsolidated sediments.

Unconsolidated sediments are loose materials that are either derived from the disintegration and erosion of solid rock formations (residuum) or from fragments of material deposited by wind (loess deposits), water (fluvial and alluvial deposits), ice (glacial deposits), or mass movement (colluvial deposits).

The volcanic rock and deposits include two types of volcanic rocks formed during the Quaternary Period and two groups of older Miocene basalt flows from the Columbia River Basalt Group: Wanapum Basalt and Grande Ronde Basalt. Those units are overlain in several places by various types of unconsolidated sediments formed during the Pleistocene and Holocene (11,700 years ago to today) epochs of the Quaternary Period.

The underlying geology of the study area includes Miocene basalt flows with areas of loess deposits in the northern portion and Pleistocene to Holocene age unconsolidated sediments over Miocene basalt flows along the Columbia River in the southern portion (FFP 2020a). The steep bluff in the central portion includes exposures of Miocene basalt that are partially obscured by loose rocks and rocky debris (talus and scree) that has eroded from the upper slopes (FFP 2020a). Quaternary landslide deposits have also been mapped along the steep bluff in the vicinity of the study area (Phillips and Walsh 1987).

The location of the proposed upper reservoir is underlain by the Frenchman Springs Member of the Wanapum Basalt Formation. The location of the lower reservoir is underlain by a member of the Grand Ronde Basalt Formation (Figure 4.1-2). The vertical shaft that would be constructed below the upper reservoir would extend through the Frenchman Springs Member of the Wanapum Basalt, a potential layer of Vantage Sandstone, and an upper member of the Grand Ronde Basalt. The headrace and tailrace tunnels, powerhouse, transformer gallery, and main and multi-use tunnels would extend through the Grand Ronde Basalt.

Quaternary deposits mapped within or immediately adjacent to the study area include loess deposits characterized by unconsolidated silt and fine sand deposits of variable thickness that were deposited from windblown sediments related to past continental glaciation conditions in Eastern Washington (FFP 2020a). These deposits are widespread across the surface in the upper portions of the study area north of the steep bluff and extend into the proposed footprint of the upper reservoir and its associated laydown area (Figure 4.1-2). An alluvial fan deposit is mapped within the proposed footprint of the lower reservoir (Figure 4.1-2).

Two areas of Quaternary landslide deposits are mapped in the vicinity of the study area along the steep bluff above the Columbia River (Figure 4.1-2). One occurs approximately 0.25 mile to the west of the proposed project and covers a broad area. The other is farther to the northeast, downslope from the existing access road that is proposed to be used to access the upper reservoir, on the face of the steep bluff. Both landslide deposits appear to be developed from material that collapsed from the upper portions of the steep southern slope of the Columbia Hills ridgeline (FFP 2020a). Landslide deposits in the area to the northeast typically consist of large blocks of rock debris in a matrix of finer sediment debris and thick deposits of angular fragments of basaltic talus accumulating at the base of steep slopes (FFP 2020a).

Talus deposits, which include accumulations of angular basaltic fragments that have fallen from the cliffs and steep slopes above, extend into the study area and project boundary upslope from the proposed location of the lower reservoir (FFP 2020a). They primarily occur along a broad, irregular band along the

base of the steep bluff (Figure 4.1-2). Spokane/Lake-Missoula Flood deposits are characterized by silt, sand, gravel, and boulders of variable and diverse composition. They include a relatively thin veneer of sediments on the Miocene basalt bedrock bench immediately adjacent to the Columbia River in the location of the proposed lower reservoir, in the area upslope from that location, and in terrace deposit remnants at the bottom of the steep slope (Figure 4.1-2).

Geologic Structures

The proposed project is in a region of moderate folding and faulting of the underlying Miocene basalt, with evidence of thrust faulting, strike-slip faulting, and folding of the basalt rocks occurring throughout the study area (FFP 2020a). The Columbia Hills Anticline, a broad east-west trending anticlinal arch that underlies the Columbia Hills, is the primary structural feature in the vicinity (Figure 4.1-1). Several minor local folds or bends associated with the anticline are also present in the areas surrounding the study area. A thrust fault associated with the southern limb of the anticline crosses the study area trending west-southwest to east-northeast (Figure 4.1-2). That fault extends across the proposed project boundary between the proposed locations of the upper and lower reservoirs then splits into two separate limbs to the west of the study area. 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 to the west and east of the study area (FFP 2020a; Figure 4.1-2). The Goldendale strike-slip fault extends along the western edge of the study area, with portions potentially extending into the proposed project area. The combination fault passes through the site of the former CGA smelter.

Thrust faults are a type of dip-slip faults where the upper block moves up and over the lower block.

Strike-slip faults are near-vertical fractures between two blocks of rock where the blocks slide horizontally past one another.

Dip-slip faults are angled fractures between two blocks of rock where the blocks slide vertically past one another. This fault type includes both normal and thrust faults.

The age of the folding and faulting in this region is not well understood, although there is evidence that it was active prior to and during the eruptions that created the Columbia River Basalt Group and continued to occur until approximately 4 million years ago (Reidel et al. 1989). In a 2002 geotechnical report prepared for another project in the vicinity, Shannon & Wilson determined that given the estimated age of local faulting and the general lack of earthquake activity within a radius of about 8 miles of the study area, the faults are not considered to be capable of producing earthquakes (Shannon & Wilson 2002).

Soils

Soil is the unconsolidated mineral or organic material that occurs in the upper portion of the Earth's surface and supports the growth of plants. It consists of a mix of minerals derived from weathered rock (approximately 45%), organic material (approximately 5%), and spaces filled with varying amounts of air or water (approximately 50%; Earle 2015).

The U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS) Web Soil Survey identifies 17 soil map units within the study area (USDA-NRCS 2019, 2021). These soil map units are listed by symbol in Table 4.1-1 and shown in Figure 4.1-3. The NRCS mapping identifies a small area of "water" in the study area south of SR 14. That area corresponds to a portion of the previously closed and capped WSI of the former CGA smelter (FFP 2020a; Tetra Tech et al. 2015) and no longer supports open water.

Although several soil map units are mapped for each portion of the proposed project area, each of the soils in the study area is described as well drained and the soils share many general characteristics. Soil information described in this section is derived from information provided in the Applicant's FERC FLA (FFP 2020a) based on the soils mapping and descriptions provided by the NRCS Web Soil Survey (USDA-NRCS 2021). Information on the drainage class and water and wind erodibility is summarized in Table 4.1-1. Of the soil types present in the study area, only Ewall loamy sand is classified as prime farmland soil by NRCS, but only when irrigated (FFP 2020b).

Soil types are often characterized based on texture, defined by the relative proportions of sand, silt, and clay particles present. Common examples of soil textures include silt loam, silty clay loam, and sandy loam. If larger rock fragments are commonly present in the soil, the general type of those fragments can be included in the texture (e.g., gravelly loam, cobbly silt loam, very cobbly fine sandy loam).

A soil's texture in combination with other physical properties (e.g., structure, porosity, density, plasticity, color, aggregate stability), chemical properties, and location in the landscape determine characteristics such as erodibility, permeability, fertility, and drainage.

Table 4.1-1
Soil Map Units within the Study Area

MAP UNIT SYMBOL	MAP UNIT NAME	GEOLOGIC PARENT MATERIAL	DRAINAGE CLASS[1]	RANGE OF WATER EROSION FACTORS[2,3]		WIND ERODIBILITY INDEX[4]
				Kw[2a]	Kf[2b]	
100	Dallesport very cobbly fine sandy loam, 0% to 8% slopes	Loess, basalt alluvium	Somewhat excessively drained	0.15	0.32	48
103	Dallesport-Rock outcrop complex, 0% to 15% slopes	Loess, basalt alluvium	Somewhat excessively drained	0.15	0.32	48
105	Ewall loamy sand, 0% to 8% slopes	Loess	Excessively drained	0.2	0.2	134
108	Ewall-Rock outcrop complex, 0% to 15% slopes	Loess	Excessively drained	0.2	0.2	134
990	Goldendale-Lorena-Rockly complex, 2% to 30% slopes	Loess, slope alluvium, basalt colluvium and residuum; volcanic ash	Well drained	0.37	0.37	56
1032	Goodnoe-Swalecreek-Horseflat complex, 30% to 65% slopes	Basalt colluvium and residuum, loess	Well drained	0.05	0.17	48
724C	Haploxerolls-Rubble land complex, 30% to 50% slopes	Basalt colluvium and residuum, loess	Well drained	0.1	0.2	56
775	Horseflat cobbly silt loam, 2% to 15% slopes	Basalt colluvium and residuum, loess	Well drained	0.24	0.43	48
94A, 994A	Lorena silt loam, 5% to 10% slopes	Slope alluvium, basalt colluvium, loess, volcanic ash	Well drained	0.37	0.37	56
994B	Lorena silt loam, 10% to 15% slopes	Slope alluvium, basalt colluvium, loess, volcanic ash	Well drained	0.37	0.37	56
994C	Lorena silt loam, 15% to 30% slopes	Slope alluvium, basalt colluvium, loess, volcanic ash	Well drained	0.37	0.37	56
951	Lorena-Rockly complex, 30% to 65% slopes	Slope alluvium, basalt colluvium, loess, volcanic ash	Well drained	0.37	0.37	56
21	Rock outcrop-Rubble land complex, 65% to 90% slopes	Unweathered bedrock	Not applicable	—	—	—
721	Rock outcrop-Rubble land-Haploxerolls complex, 30% to 90% slopes	Unweathered bedrock, basalt colluvium and residuum, loess	Well drained	—	—	—
14B	Rockly very gravelly loam, 2% to 30% slopes	Basalt colluvium, loess, volcanic ash	Well drained	0.1	0.32	0

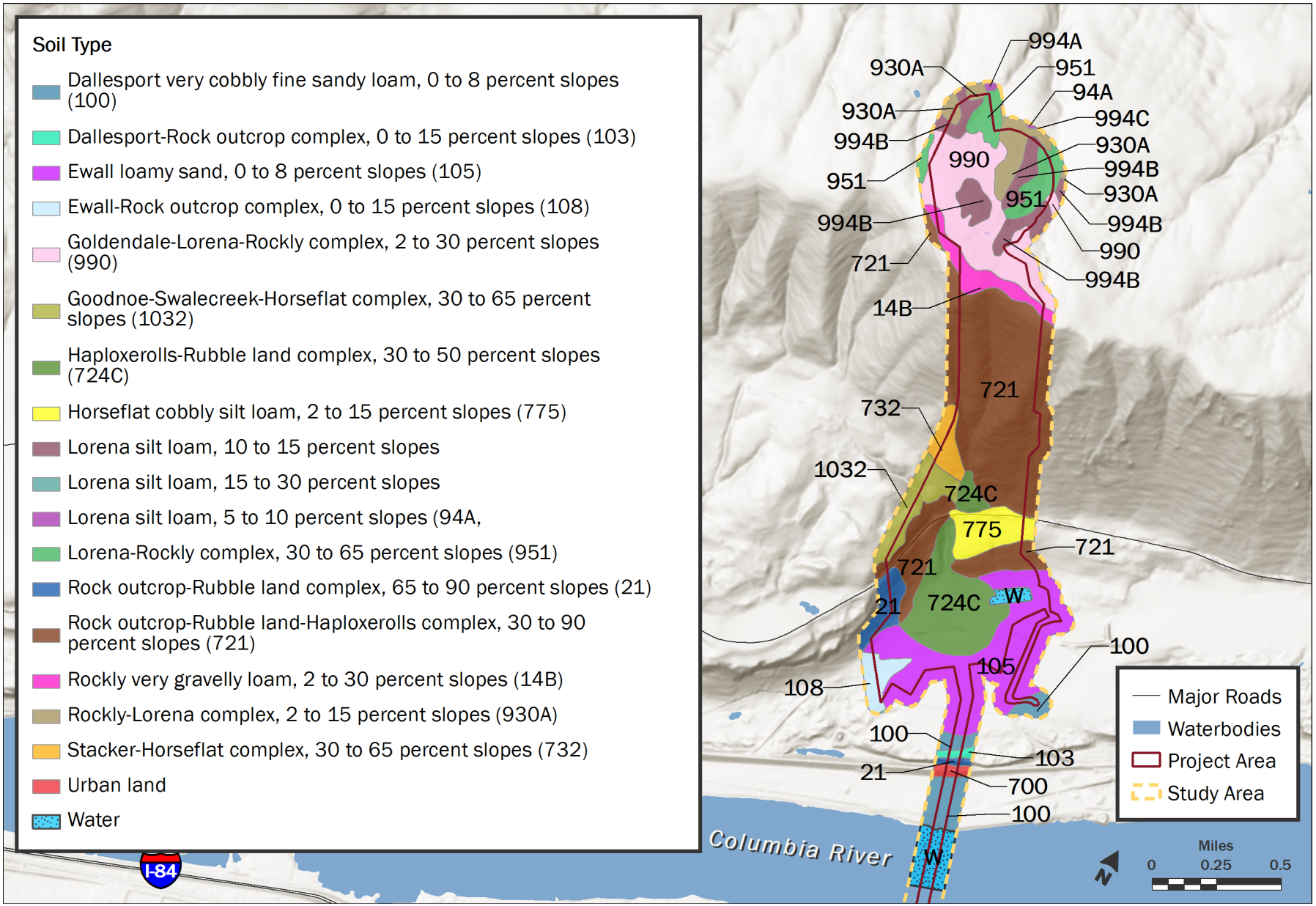
MAP UNIT SYMBOL	MAP UNIT NAME	GEOLOGIC PARENT MATERIAL	DRAINAGE CLASS[1]	RANGE OF WATER EROSION FACTORS[2,3]		WIND ERODIBILITY INDEX[4]
				Kw[2a]	Kf[2b]	
930A	Rockly-Lorena complex, 2% to 15% slopes	Basalt colluvium, loess, volcanic ash	Well drained	0.1	0.32	0
732	Stacker-Horseflat complex, 30% to 65% slopes	Basalt colluvium and residuum, loess	Well drained	0.37	0.37	56

Sources: USDA-NRCS 2019, 2021

Notes:

2. Drainage Class refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed (USDA-NRCS 2021).
3. Water Erosion Factors are used to indicate the susceptibility of a soil to sheet and rill erosion by water (USDA-NRCS 2021). Two different factors are considered:
   a. Erosion Factor Kf (rock free) indicates the erodibility of the fine-earth fraction of a soil, or the material less than 2 millimeters in size (USDA-NRCS 2021).
   b. Erosion Factor Kw (whole soil) indicates the erodibility of the whole soil (USDA-NRCS 2021).
4. Water Erosion Factors were assigned the following ranges by the Applicant: 0.02 to 0.15 = Low; 0.16 to 0.28 = Moderately Low; 0.29 to 0.43 = Moderate; 0.44 to 0.55 = Moderately High; 0.56 to 0.69 = High (FFP 2020a). Value of "---" means that a Water Erosion Factor was not assigned by NRCS.
5. Wind erodibility is based on the Wind Erodibility Index assigned by NRCS (USDA-NRCS 2021). The Wind Erodibility Index is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion (USDA-NRCS 2021). Wind Erodibility Index values were assigned the following range by the Applicants: 0 to 62 = Low; 63 to 124 = Moderately Low; 125 to 186 = Moderate; 187 to 248 = Moderately High; and 249 to 310 = High (FFP 2020a). Value of "---" means that a Wind Erodibility Index was not assigned by NRCS.

Figure 4.1 3
Soils Map



Data Source: USDA-NRCS 2021

Soils are distinct in three portions of the study area:

- **Proposed upper reservoir area:** Soils in the upper reservoir area primarily consist of Lorena silt loam, Goldendale silt loam, and Rockly very gravelly loam as individual soil types and as multi-soil complexes. Rockly soils are predominant along the top of the steep bluff separating the upper reservoir area from the lower reservoir area. Soil types in this area have low to moderate water erodibility and moderately low wind erodibility.
- **Steep bluff between the proposed reservoir areas:** Soils on the steep bluff that separates the reservoir areas are sparse, consisting primarily of rock outcrops and rubble with a veneer or pockets of haploxeroll soils; Horseflat cobbly silty loam and Horseflat soils complexed with other, similar soil types such as Stacker silt loam; and Rockly very gravelly loam (Figure 4.1-3). Water erodibility of these soil types ranges from low to moderate and wind erodibility ranges from low to moderately low.
- **Proposed lower reservoir area and former CGA smelter site:** The majority of the lower reservoir would be constructed in an area currently occupied by the WSI, a closed Solid Waste Management Unit (SWMU) associated with the former CGA smelter. The native soils in the WSI were excavated in 1981 and replaced with a liner and industrial wastes produced by historical operation of the CGA smelter (FFP 2020a). In 2005, the WSI was closed and capped with engineered cap consisting of a sand layer, geosynthetic clay layer, geomembrane layer, geotextile drainage layer, and soil cover (FFP 2020a). The WSI is described in more detail in Section 4.10 and the *Environmental Health Resource Analysis Report* (Aspect and Anchor QEA 2022), in Appendix I.

  The portions of the lower reservoir area not previously disturbed by smelter activities generally consist of a mixture of Horseflat and Dallesport cobbly silty loams, Ewall loamy sand, and bedrock outcrops with haploxeroll soils and rubble (Figure 4.1-3). Water erodibility of these soil types ranges from low to moderate and wind erodibility ranges from low to moderate.

Topography

Area topography is depicted using shading in Figure 4.1-3 and with line contours in Figure 4.1-4. As shown in these figures, there is considerable topographic variation across the study area. The northern portion of the study area—where the upper reservoir and associated features are proposed—is in the Columbia Hills on a high desert plateau. The highest elevations in that area are approximately 3,000 feet North American Vertical Datum of 1988 (NAVD88) along the edge of the bluff (Figure 4.1-4). From that point and extending through the upper reservoir area to the northwest, the land slopes gently down to around 2,700 feet NAVD88 over a distance of about 3,300 feet. Slopes in that area are around 12%. Surrounding topography is generally rolling hills and rangeland.

The steep bluff between the northern and southern portions of the study area ranges from around 900 feet NAVD88 along SR 14 to approximately 3,000 feet NAVD88 at the edge of the upper plateau (Figure 4.1-4). Slopes in that area vary from 55% to 85% (FFP 2020b). The proposed headrace and tailrace tunnels and their associated manifolds, powerhouse, transformer gallery, and multi-use and main access tunnels would be constructed underground beneath this slope.

The southern portion of the study area—where the lower reservoir, tunnel portals, and associated features are proposed—occurs on a topographic bench (a former floodplain plateau) approximately 580 feet above and 1,500 feet north of the Columbia River. Elevations in that area range from around 400 feet NAVD88 along the southeastern edge of the proposed reservoir location to 800 feet NAVD88 along its northwestern edge (Figure 4.1-4). Slopes in the lower reservoir area are generally around 10% from a

BNSF railroad embankment in the southeast portion of that area, to SR 14. Surrounding topography is relatively flat terrace lands with gentle to moderately sloped areas along the base of the steeper plateau slope. South of the lower reservoir area, that topographic bench generally terminates in a line of cliffs above the Columbia River. The Columbia River surface water elevation in the Lake Umatilla pool upstream of John Day Dam ranges from approximately 253 to 264 feet NAVD88, whereas downstream of the dam, the Lake Celilo pool elevation ranges from approximately 151 to 156 feet NAVD88.

Where the proposed aerial transmission lines extend southward into Oregon, the topography on the south side of the river rises to roughly 1,150 feet NAVD88 before dropping to the west into Scott Canyon (approximately 550 feet NAVD88) and then rising farther west to approximately 900 feet NAVD88 where the aerial transmission lines would terminate at John Day Substation (Figure 4.1-4).

Unique Physical Features

Unique physical features in the study area include the steep bluff that rises above the Columbia River and separates the upper and lower portions of the project area. That bluff provides an exposure of the underlying Miocene basalt and represents a dramatic element of the regional geology.

Erosion and Accretion

Past erosion in the study area is most apparent on the steep bluff where landslides have previously occurred and both talus and scree have eroded and fallen from rocks farther upslope. That material has accumulated on slope faces and along the base of the bluff. As discussed in the Geologic and Seismic Hazards section after Figure 4.1-4, the processes that caused this erosion are primarily related to slope stability and mass movement.

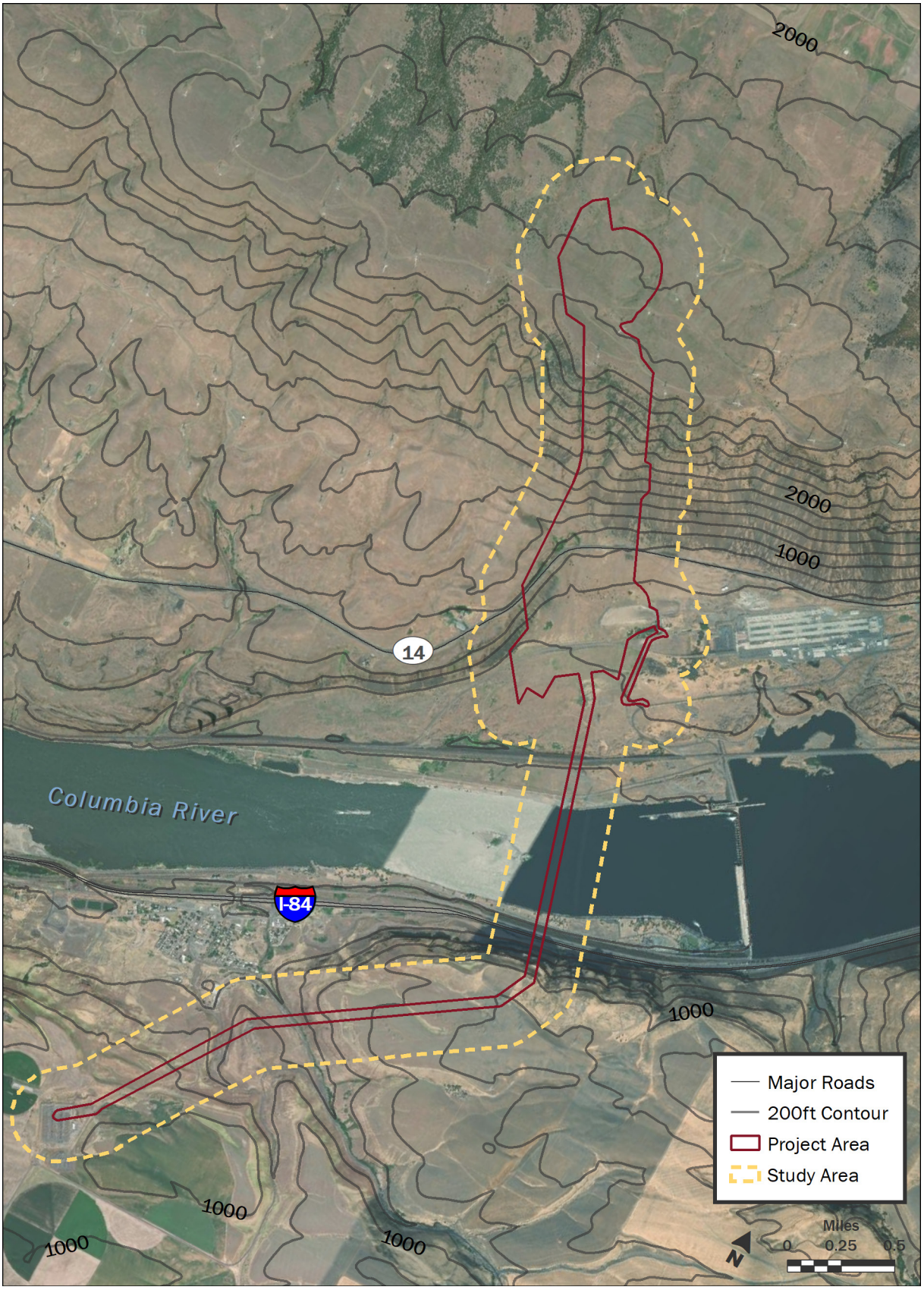
Erosion is the process by which earthen materials (e.g., rock and soil) are worn away and moved by flowing water, wind, ice, or gravity (e.g., mass movement).

Accretion is the accumulation of eroded materials in a different location than where they eroded from (e.g., sediment deposition in a floodplain).

Because the study area does not receive much rainfall, episodic erosion from flowing water is minimal (FFP 2020a). The soil types in the study area all have low to moderate water erodibility factors, which also contribute to fairly low erosion potential from flowing water. However, erosion hazards related to water may occur over longer periods and include soil erosion and loosening of rock and soil in the bluffs above the lower reservoir, causing a potential for gradual or catastrophic movement of rock and soil (FFP 2020a). Surface and near-surface water flow can also erode soils and weaken rock (such as during freeze-thaw cycles).

Due to the relatively windy conditions of this region, there is likely a high potential for wind erosion in the study area. The soil types in the study area have a low to high range of wind erodibility factors. Soils with the highest wind erodibility factors are in the southern portion of the study area in the area of the proposed lower reservoir (FFP 2020a; USDA-NRCS 2021). The potential for wind erosion is reduced by the presence of vegetation, which serves to hold the soil in place.

Figure 4.1 4
Existing Topography of the Study Area



Data Source: USGS 2021c

Geologic and Seismic Hazards

Evaluation of geologic and seismic hazards for the study area included the following types of events and their associated hazards, discussed in paragraphs below:

- Landslides
- Earthquakes
- Volcanic hazards

Geologic hazards are large-scale, complex natural events that occur on land and that are capable of causing immense damage, loss of property, and sometimes loss of life (UW 2021).

Seismic hazards are a specific type of geologic hazard that result from ground shaking caused by earthquakes.

Landslides are a type of mass wasting event that include rockfalls or slides, debris flows, and mud flows. They can be triggered by conditions including excessive soil saturation, freeze-thaw cycles, and ground shaking during earthquakes or other seismic events. Movement may be relatively slow or very fast. Mass wasting events are common on the northern bank of the Columbia River due to deep bedrock instability (HDR 2020a; FFP 2020a). Also, freeze-thaw cycles can cause gradual movement. WDNR identifies two situations where landslides commonly occur in the general vicinity of the proposed project (HDR 2020a; FFP 2020a):

1. Where weak sedimentary layers between Columbia River Basalt flows cause the overlying basalt to slide along the weak, tilted sedimentary interbeds
2. Where weathered, tilted, and clay-rich volcaniclastic rocks fail either on their own or beneath overlying younger lava flows, transporting both downslope

Potential areas of instability that could affect the proposed project include the approximately 700-acre landslide to the east of the study area (identified by the map symbol "Qls" on Figure 4.1-2). However, no past landslide features are identified in the study area by WDNR, nor does WDNR identify any evidence of potential new major slides in the vicinity of the proposed project (WDNR 2021d). Furthermore, general reconnaissance of the Lake Umatilla reservoir shoreline conducted by the Applicant indicates that no new major landslides have developed in the area in recent years (HDR 2020a; FFP 2020a).

Large areas of deep bedrock instability are present in association with areas of faulting (Figure 4.1-2) and in areas of the Wanapum and Grande Ronde Basalt formations that are reported to have discontinuous interbeds of sedimentary deposits, saprolite (weathered rotten rock), tephra (fragmental volcanic material), and tuff (consolidated volcanic ash) that reduce slope stability (HDR 2020a; FFP 2020a). Past work by Sager (1989) indicates that sedimentary interbeds have caused extensive mass wasting and slope instability along sections of the Washington shore of the Columbia River.

In addition to past landslides and areas of potential deep bedrock instability, other areas of instability in the study area include the extensive talus deposits that form an apron at the base of the basalt cliffs (Shannon & Wilson 2002; FFP 2020a) and the consolidated debris flow deposits in the area proposed for the lower reservoir (FFP 2020a).

Earthquakes are associated with hazards of liquefaction and landslides. Six earthquakes with a magnitude greater than 1.0, the greatest being 2.7, were reported within 5 miles of the proposed project between February 1969 and October 2021 (PNSN 2021). Two of the earthquakes, recorded in 2009 and 2012, were shallow (less than 1 mile) and were approximately 3 to 4 miles west of the proposed project at the location of a historic landslide. Four earthquakes occurred east of the proposed project. 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 5.2 miles.

Other nearby fault zones considered potentially active are the Oak Flat-Luna Buttes Fault Zone (12 miles east of the project area) and Arlington-Shutler Buttes Fault Zone (16 miles east of the project area; Figure 4.1-1). 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. Although the thrust faults in the vicinity of the proposed project are listed as active, the area is in Washington State Seismic Design Category B, which is the category representing areas with the lowest relative seismic risk (FFP 2020a). The Cascadia Subduction Zone, which has the potential to cause major and highly damaging earthquakes throughout western and central Washington, is approximately 475 miles to the west of the proposed project, off the Washington Coast. The U.S. Geologic Survey Shakemap indicates that the proposed project would be within the zone of moderate shaking intensity from a Cascadia Subduction Zone-generated earthquake (Figure 4.1-1; USGS 2021a).

Liquefaction, one of the potential geologic hazards generated by earthquakes, occurs when ground shaking causes a saturated or partially saturated soil or unconsolidated sedimentary deposit to lose its strength by increasing the water pressure between the grains of the material, reducing friction, and causing the material to act like a fluid.

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 (Shannon & Wilson 2002). Missoula Flood deposits are mapped in the southern portion of the study area south of SR 14 and in an area between the study area and the BNSF railroad line. The 2002 geotechnical investigation 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 portions of the study area 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.

Mount Adams (approximately 50 miles northwest, in Washington) and Mount Hood (approximately 53 miles southwest, in Oregon) are the closest volcanos to the proposed project. Review of the maps for volcano hazards in the Mount Adams region (USGS 2014a) and Mount Hood region (USGS 2014b) shows that the proposed project is outside of the volcano hazard zones of both of these volcanos and is not susceptible to volcanic hazards including eruptions, lava/pyroclastic flows, or lahars.

4.1.1 How Impacts Were Analyzed

The analysis of the proposed project impacts on geology and soil resources was qualitative. It included review of existing geologic and geotechnical resources (WDNR 2021a, 2021d; USDA-NRCS 2019; USGS 2021a), studies prepared for the proposed project (FFP 2020a; FFP 2020b; HDR 2020a), projects previously proposed in the area such as the Cliffs Project (Shannon & Wilson 2002), and projects on adjacent sites such as the former CGA smelter site cleanup (FFP 2020a; Tetra Tech et al. 2015, 2020). Publicly available federal and state information was also reviewed on the geology, soils, and seismic hazards of the study area and surrounding region. No additional research, field studies, or modeling were performed as part of the geology and soils impact analysis.

Impacts were determined by considering the specific activities required to construct and operate the proposed project and how those activities could adversely affect underlying and adjacent geology and soil resources. The potential for construction and operation of the proposed project to increase soil erosion from ground-disturbing activities, changes in drainage patterns, and the addition of impervious surfaces was considered. The potential for changes to the risk of occurrence of geologic hazard (e.g., landslides, liquefaction, lateral spreading) was also considered.

Potential impact on humans or human activities from any increased risk of seismic hazards are discussed in the *Environmental Health Resource Analysis Report* (Appendix I).

4.1.2 Findings for the Proposed Project

4.1.2.1 Impacts from Construction

Construction of the proposed project would disturb the existing geologic and soil resources of the area through vegetation removal, scraping, grading, and both surface and subsurface excavation of soil and rock. Placement of fill material would also be needed to construct the embankments for the upper and lower reservoirs. Aboveground construction activities would occur in locations of the proposed upper and lower reservoirs and their associated laydown areas. Subsurface excavation, blasting, and tunneling would occur below the reservoir locations and underneath the steep bluff that separates the upper and lower portions of the proposed project. The following types of potential construction effects are discussed in sections below:

- Loss of soil and rock material from excavation and construction
- Increased slope instability in the study area during excavation and tunneling of the underground project elements
- Increased water and wind erosion or accretion potential from vegetation removal and soil disturbance
- Increased risk from geologic and seismic hazards through increased potential for landslides after disturbance of the soil surface

Loss of Soil and Geologic Material

Preliminary estimates from the Applicant's SEPA Checklist (FFP 2020b) indicate that the powerhouse cavern would require approximately 200,000 cubic yards of excavation and the transformer gallery cavern would require approximately 46,700 cubic yards of excavation. The Applicant has indicated that cut and fill volumes for the upper and lower reservoirs would be balanced and would equate to approximately 12 million cubic yards. Other features of the proposed project that would require excavation, fill, or grading include (but are not limited to) underground tunnels, substation and switchyard construction, utility infrastructure tie-ins, and temporary construction laydown and parking areas. Preliminary estimates indicate that approximately 1 million cubic yards of fill would be needed. Leftover fill from powerhouse cavern and transformer gallery excavation could be reused in the proposed project, if deemed suitable.

Excavated material would be reused during construction of the reservoir embankments as much as possible. However, it is likely that an unknown quantity of that material, particularly in the lower reservoir part of the project footprint, would be deemed unsuitable or inappropriate for that use due to potential contamination or the physical characteristics of the material. Excavated material would be tested per MTCA standards to determine whether the material is suitable for use in the embankments. If the excavated material is unsuitable for embankment fill, it would either be used for other aspects of the project or disposed of at an appropriate off-site facility as discussed in Section 2.3.2.3. Given that most of the material excavated would be basalt, which has a multitude of construction uses, such losses of soil and geologic materials from the study area are expected to be minimal. Excavation of rock for the construction of underground project features would not affect the overall geology and have only negligible effects on geologic formations of the area.

In the construction area for the lower reservoir, the existing industrial waste material within the WSI would be removed, along with its associated cap, and disposed of at an appropriate facility. While this

represents a potential loss of geologic materials and soil from the study area, the removal and off-site disposal of that material would likely represent a benefit to the study area. Additional information on potential impacts related to the WSI is provided in the *Environmental Health Resource Analysis Report* (Appendix I) and summarized in Section 4.10 of this EIS.

Approximately 280 acres of area currently occupied by soils would be permanently replaced with project elements including the upper and lower reservoirs, reservoir embankments, tunnel portals, and facility parking lots. Those areas would no longer support soils or plant growth. Temporary soil impacts from construction would also include soil compaction and movement within the proposed project area. Restoration work, including the decompaction of soils in the proposed laydown areas after the construction period and revegetation with native plants, would reduce soil impacts.

Increased Slope Instability

Topography in the upper and lower portions of the study area would be changed from the replacement of relatively natural landforms with excavated reservoirs and their associated embankments. No change in the topography of the steep bluff between the reservoirs is expected. Although construction would occur underneath the bluff, no modification or aboveground work would occur on the surface or to the rock and soil present on the face of the slope. The tunnel portals, lower reservoir, and associated features would be constructed on the relatively flat bench at the base of the bluff and are not expected to affect its geologic structure or stability.

Based on the Applicant's Preliminary Supporting Design Report (HDR 2020a), construction of the proposed project could encounter multiple areas of instability in both the above- and belowground portions of the study area. Most of those instances are associated with uncertain conditions in the underlying basalt formation layers, especially in those locations where faults cross the study area and in locations where unconsolidated deposits occur (Figures 4.1-1 and 4.1-2).

To address those issues, many of the recommendations in the Preliminary Supporting Design Report (HDR 2020a) have been incorporated into the Applicant's proposed project description (e.g., concrete liner in upper reservoir, concrete and/or steel lining in conveyance system tunnels). However, because of the uncertainty related to the geologic conditions, there would be some impacts on slope stability from construction. Additional geotechnical studies and design updates proposed by the Applicant could further reduce these impacts, which are not expected to be significant.

Increased Erosion or Accretion

Construction of the project would remove vegetation and expose soils to stormwater and wind, increasing the potential for erosion to occur. Such conditions would be more prone to occur in areas with moderate to steep slopes that have soils with moderate to high water and wind erodibility factors. In the upper portion of the study area, stormwater could erode exposed soils and carry sediment into the Swale Creek drainage system. Any potential impacts on aquatic species and habitat in that system are discussed in Section 4.6 and the *Aquatic Species and Habitats Resource Analysis Report* (Anchor QEA 2022a), in Appendix F.

In the lower portion of the study area, stormwater could carry sediments into wetlands and drainage downslope of that area. Any potential impacts on that system are discussed in Section 4.2 and the *Wetlands and Regulated Waters Resource Analysis Report* (Anchor QEA 2022b), in Appendix C. While such flows are unlikely to reach the Columbia River, they could affect the drainage systems associated with SR 14 and the BNSF railroad line. Because the region receives minimal rainfall, wind erosion is likely to be a bigger concern than stormwater erosion. Wind blowing over exposed soils could also carry soil particles into adjacent waterways or onto vegetation where it could accumulate over time.

In Exhibit E of the FLA, the Applicant has stated that they will develop plans to manage stormwater and address erosion associated with all aspects of project construction via a Soil Erosion Control Plan (FFP 2020a, 2020b). That plan will include BMPs and will describe requisite erosion control measures to ensure that impacts from erosion and sedimentation are minimized. Both Washington state law and the federal Clean Water Act require NPDES permitting stormwater management during construction.

Because these authorizations and others issued for the proposed project would require the preparation of sediment and erosion control plans and the implementation of BMPs to reduce the occurrence of erosion (e.g., silt fencing, revegetation, and dust suppression measures), these types of impacts are not expected to be significant adverse impacts.

Increased Risk of Geologic and Seismic Hazards

There is a possibility that construction activities could moderately increase geologic and seismic hazards, primarily associated with potential stability issues in the area, including the potential for landslides from disturbance of the soil surface. These impacts could potentially be further reduced following additional geotechnical studies and design updates proposed by the Applicant, and therefore are not expected to be significant.

Summary of Construction Impacts

The proposed project is not expected to result in any significant adverse impacts on geology and soil resources within the study area. Many of the potential impacts have the potential to be reduced with the implementation of standard BMPs and design considerations proposed by the Applicant.

4.1.2.1 Impacts from Operation

Impacts on geology and soils from project operation would be limited to a potential increase in geologic and seismic hazards. During the operational phase of the project, a local or regional earthquake could cause liquefaction of fluvial deposits in the vicinity of the lower reservoir, potentially resulting in damage to the reservoir embankment, as well as other project elements. Although local faults are unlikely to produce earthquakes, the study area is within the moderate shaking zone for a Cascadia Subduction Zone earthquake.

Increased Risk of Geologic and Seismic Hazards

Although the study area is in a relatively low probability risk seismic zone, there is some potential for seismic events to cause soil liquefaction and lateral spreading in the Missoula Flood deposits to the north and south of the proposed lower reservoir (Figure 4.1-2). If soils in those areas would liquify during a seismic event, the embankment and liner of the lower reservoir (and other project elements) could be damaged. The potential for such events to be triggered by an earthquake generated at one of the local faults is unlikely, as previous geotechnical studies have concluded that the faults in the vicinity of the proposed project are not capable of producing earthquakes (Shannon & Wilson 2002). However, the proposed project is in the moderate shaking zone for a Cascadia Subduction Zone earthquake, which has the potential to result in liquefaction in those sediments. Therefore, there is a moderate potential for impacts, but they are not likely to result in any significant adverse impacts.

To further address this potential impact, the Applicant is proposing to perform additional geotechnical studies in the lower and upper reservoir areas and other locations during the next phase of proposed project engineering design. Those studies would evaluate the seismic hazard and liquefaction and lateral spreading potential and would be conducted in conjunction with project design in preparation for construction. Future engineering designs would include measures to ensure safety of project structures pursuant to FERC's Safety of Water Power Projects and Project Works (CFR 18.12). Subpart A, Section 12.5 of those rules require that a licensee or applicant "use sound and prudent engineering

practices in any action relating to the design, construction, operation, maintenance, use, repair, or modification of a water power project or project works." Those rules also include provisions for regular facility inspections, installation of monitoring equipment, reporting, preparation of emergency action plans, and the installation of warning and safety devices. Incorporation of such measures would potentially further reduce the potential for impact.

4.1.2.1 Proposed Mitigation Measures

No mitigation measures would be required because there would be no significant adverse impacts. Specific permit conditions and mitigation actions would be confirmed by regulatory agencies during permitting for the proposed project.

4.1.2.2 Significant and Unavoidable Adverse Impacts

There would be no significant adverse impacts related to geology and soils from construction or operation of the proposed project.

4.1.3 Findings for the No Action Alternative

Under the No Action Alternative, the proposed project facilities would not be constructed. Investigation of contamination and development of cleanup actions for the CGA smelter site would continue through the separate MTCA cleanup process.

In the absence of the proposed project fully removing the WSI, it is unknown what cleanup action would be required for the WSI through the full site cleanup process, which is underway. Under the MTCA process, a feasibility study would evaluate alternatives to address the contaminant impacts associated with all areas of the site including groundwater impacts associated with the WSI. For purposes of evaluating the No Action Alternative, it is assumed that the MTCA disproportionate cost analysis conducted as part of the feasibility study would likely conclude that the incremental cost to fully remove the WSI would be greater than the incremental environmental benefit achieved relative to the continued containment, inspection, and monitoring of the WSI. Therefore, under the No Action Alternative, it is assumed that the WSI would remain intact and continue to be monitored and maintained under the existing closure plan. However, the WSI would remain within the ongoing MTCA cleanup process for the smelter site and could be subject to additional remedial actions potentially requiring long-term stewardship measures, monitoring, and land-use restrictions that would be expected to be part of the cleanup plan. This is not expected to result in adverse changes to the geology and soils in the study area. Therefore, there would be no significant adverse impacts related to geology and soils under the No Action Alternative.

4.2 Water Resources

In this EIS, the term "water" means surface water (including streams, rivers, lakes, and reservoirs), groundwater (water in a saturated zone beneath the ground surface), and wetlands (areas frequently saturated by surface or groundwater and supporting wetland vegetation and characteristics).

The *Surface and Groundwater Hydrology Resource Analysis Report*, in Appendix B, and the *Wetlands and Regulated Waters Resource Analysis Report*, in Appendix C, have the full analyses and technical details used to evaluate water resources. The reports evaluate water quantity (flows and levels); water quality; water uses and rights; and wetlands and other regulated waters (non-wetland waterbodies including streams, rivers, ponds, and lakes) that are specifically protected by federal, state, and local regulations for their ability to perform important ecological functions and provide services that are valued by society. The *Wetlands and Regulated Waters Resource Analysis Report* also evaluates potential impacts on the protective buffers required for wetlands and regulated waters by state and local regulations. This section summarizes how impacts were evaluated and presents the main findings of the analyses from the two reports.

The study area for water resources encompasses surface waters, groundwaters, and wetlands with the potential to be affected by construction or operation of the proposed project. For surface and groundwaters, it includes those in the proposed project area as well as downstream ponds and streams, downgradient groundwater, and the adjacent and downstream Columbia River to its confluence with the Pacific Ocean (Figures 4.2-1 and 4.2-2). The study area also encompasses belowground areas that would be occupied by underground infrastructure, within the bedrock bluff between the proposed project's two surface reservoirs. For wetlands and regulated waters, the study area includes a 1,000-foot offset from the project area boundary to account for potential indirect effects of the project on those water resources (Figure 4.2-2).

Key Findings of the Water Resources Analysis

The analysis found the proposed project would have **no significant and unavoidable adverse impacts** related to water resources.

Construction would permanently impact 0.09 acre of wetlands and streams and 1.34 acres of stream buffer, as well as temporarily impact 0.06 acre of wetlands and streams and 0.89 acre of stream buffer.

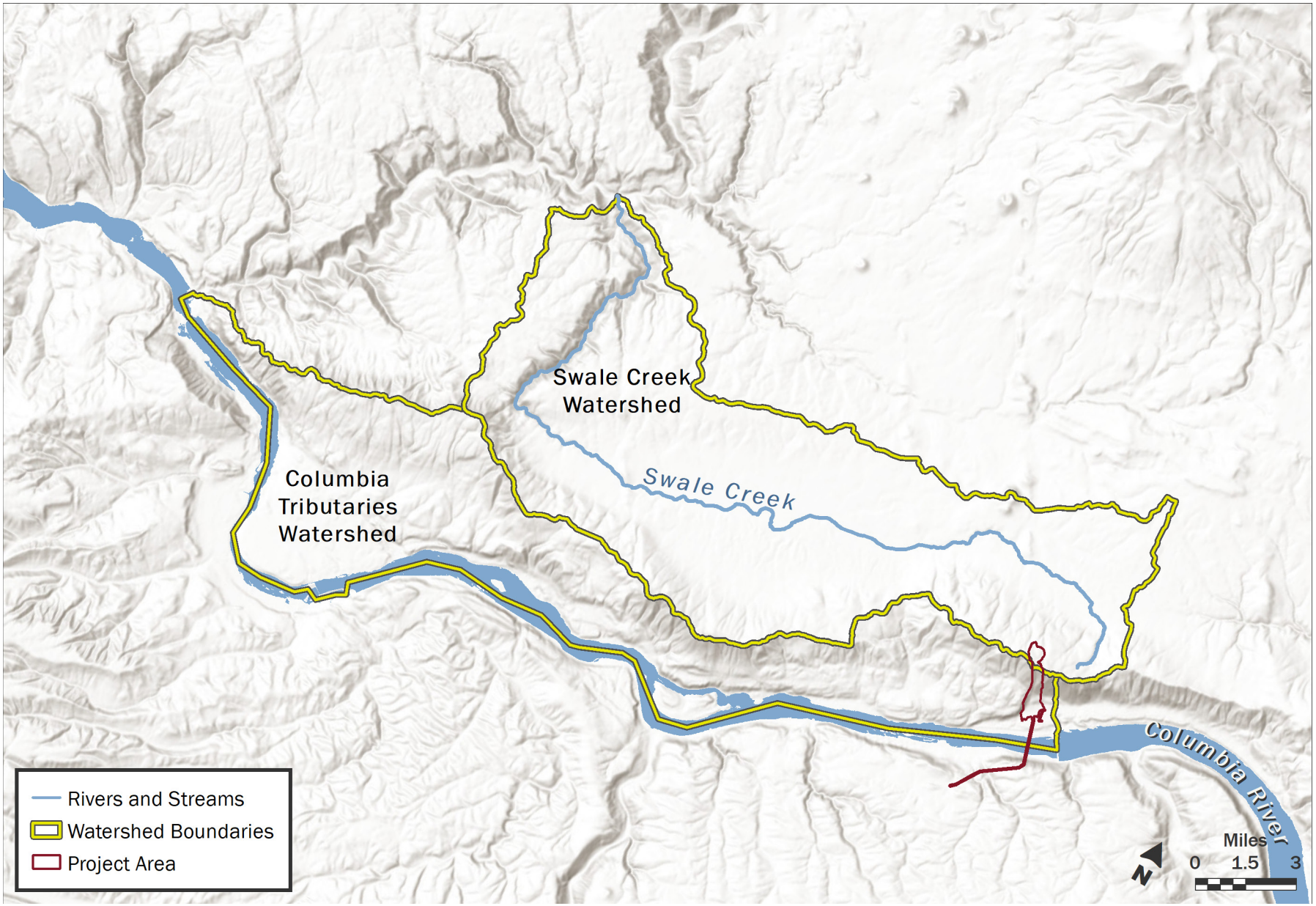
An initial fill of 7,640 acre-feet and an estimated 360 AFY of make-up water would be required. Through an existing water right and authorized consumptive use, this would not impair water supplies or water rights.

The reservoirs would capture precipitation, and the system would result in some evaporation and leakage, but the proposed project would not substantially alter surface water hydrology. There would be some alteration to groundwater flow that will be monitored.

Temporary increases in turbidity and pollutants in stormwater would be controlled to comply with water quality permit benchmarks and criteria. Water quality will likely degrade within the pumped storage system over time but would be managed and is not expected to result in significant impacts on water quality in receiving waters.

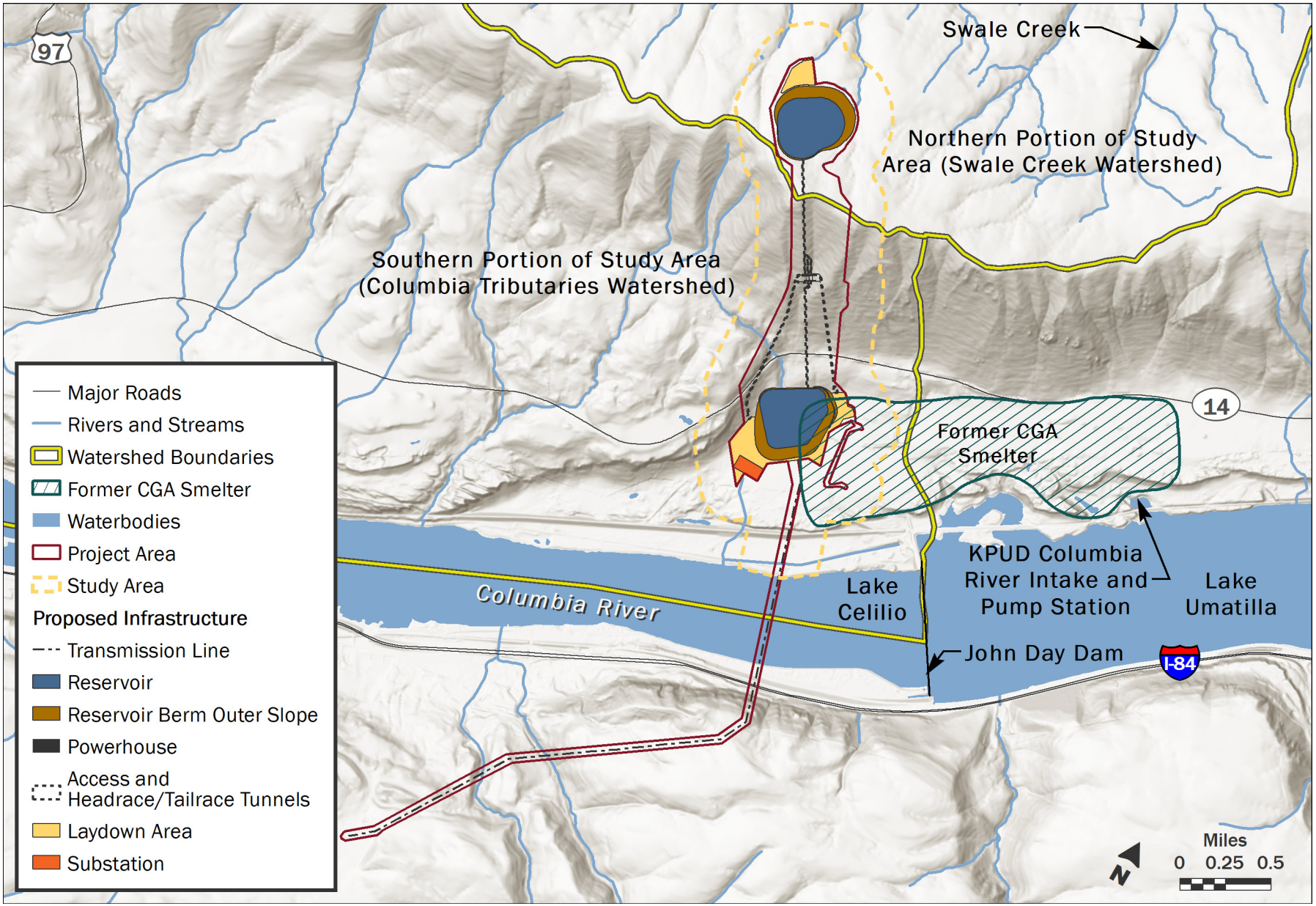
Mitigation is not required to reduce any significant impacts, but compensatory mitigation for impacts on wetlands and waterbodies will be required through permitting. Additional restoration of disturbed wetlands, streams, and buffers; shade balls in reservoirs; a reservoir water quality monitoring plan; and construction and operations monitoring and response plans are proposed to further reduce potential impacts.

Figure 4.2 1
Project Location



Data Sources: WDNR 2021e; USGS 2021d

Figure 4.2 2
Water Resources Study Area



Data Sources: WDNR 2021e; USGS 2021d

The proposed project would be located in a region that has hot and dry conditions in the summer (90°F average daytime high temperature in July) and relatively cold conditions in the winter (40°F average daytime high temperature in December), with some moderation in temperatures due to proximity to the Columbia River (Tetra Tech et al. 2015). Most precipitation occurs November through February, with the wettest months being December and January (Tetra Tech et al. 2015). The evaporation rate is estimated to be approximately 65 inches per year (HDR 2020b). The potential effects of climate change on seasonal temperature, precipitation, and evaporation are more fully described in Chapter 5.

The project area is within two watersheds (Figures 4.2-1 and 4.2-2; USGS 2021d). The northern (upper) portion of the project area is in the Swale Creek watershed, which is in the Klickitat River subbasin. The southern (lower) portion of the project area is in the Columbia Tributaries watershed, which is within the Middle Columbia-Hood subbasin. Both watersheds are within the Middle Columbia Basin and in Washington's Klickitat Watershed, Water Resource Inventory Area 30 (WPN and Aspect 2005; Ecology 2021a).

Northern Portion of the Study Area (Swale Creek Watershed)

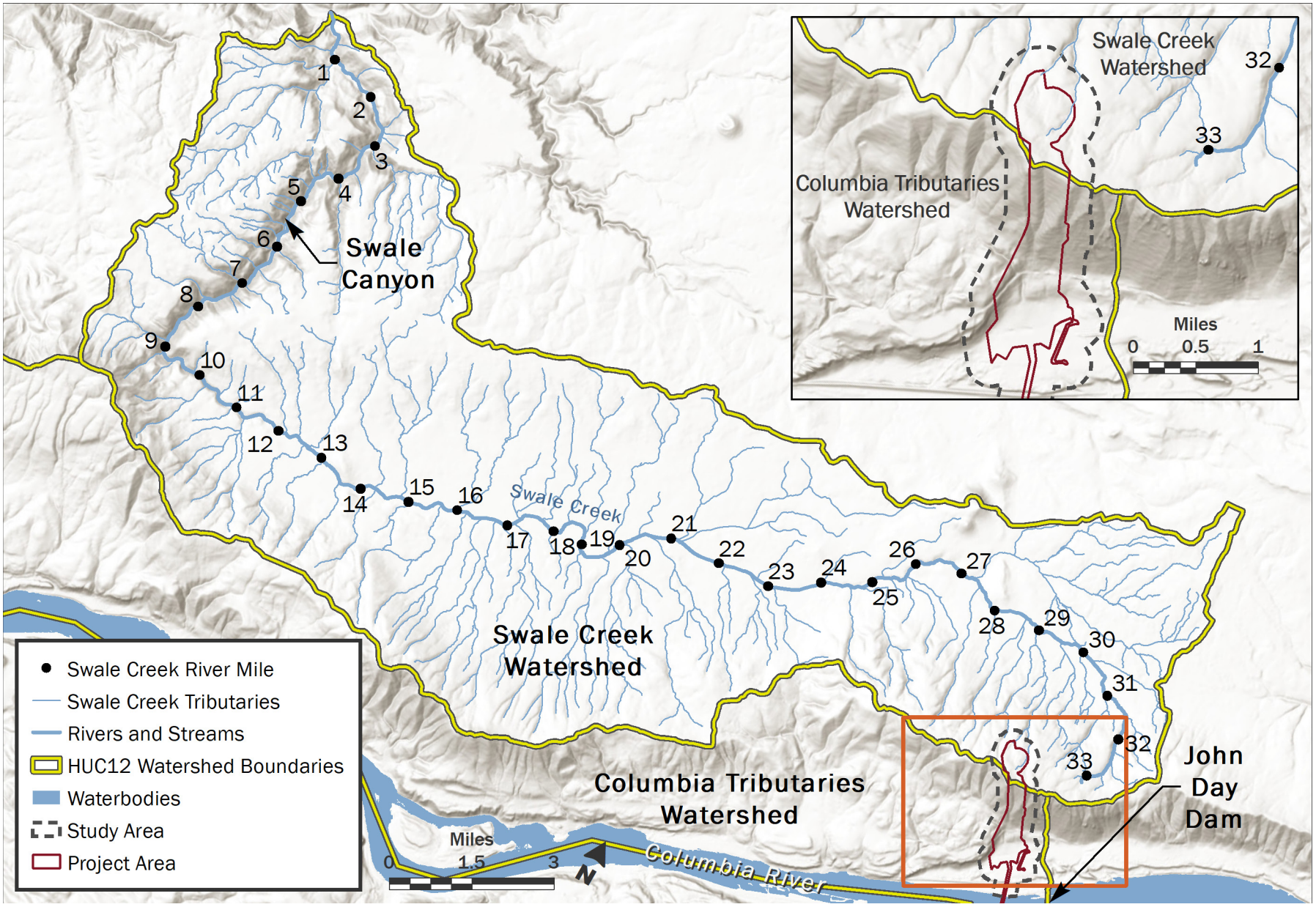
The northern portion of project area, where the upper reservoir would be constructed, is at the top of a steep bedrock bluff. That bluff is part of the Columbia Hills and rises approximately 2,500 feet in elevation above the southern portion of the project area. Annual average precipitation is estimated to be approximately 17 inches for the northern portion of project area (HDR 2020b). The northern portion of the project area drains to the north to Swale Creek, which flows westward through Swale Valley, a broad alluvial-filled basin (Figure 4.2-3). Flow then proceeds into Swale Canyon, a deeply incised bedrock canyon, before discharging to the Klickitat River, which flows southwest to the Columbia River. Within Swale Valley, Swale Creek is an expression of the water table in a surficial alluvial aquifer. Consequently, that portion of Swale Creek flows during the winter and early spring when the water table is high but is commonly dry from early summer until winter precipitation begins. In Swale Canyon downstream of Swale Valley, creek flows are flashy, with high flows occurring for short durations in response to winter storm events or snowmelt runoff (Aspect Consulting 2010, 2013). For much of the rest of the year, water in Swale Canyon typically exists as a series of discontinuous pools with little connecting flow.

Aquifers are saturated and permeable subsurface layers or geologic units that yield groundwater in recoverable quantities via wells or springs.

Surficial aquifers are aquifers that occur in unconsolidated sand and gravel alluvium.

The designated uses for Swale Creek are as follows: salmonid spawning, rearing, and migration; primary contact recreation; domestic, industrial, and agricultural water supply; stock watering; wildlife habitat; harvesting; commerce and navigation; boating; and aesthetic values. However, Ecology designated the approximately 12 miles of Swale Creek from the mouth to nearly Harms Road (i.e., the portion primarily within Swale Canyon) as waters requiring supplemental protection for salmonid spawning and incubation, dictating more stringent water quality standards for water temperature (Figure 4.2-3; Ecology 2011). The lowermost approximately 3 miles of Swale Creek, within Swale Canyon, does not meet applicable water quality standards for temperature—based on supplemental protection for salmonid spawning and incubation—and therefore is on the state 303(d) list (Category 5) for temperature (Ecology 2016a).

Figure 4.2 3
Watersheds Surrounding the Proposed Project



Data Source: WDNR 2021e

Southern Portion of the Study Area (Columbia Tributaries Watershed)

The southern portion of the project area, where the lower reservoir and associated power transmission infrastructure would be located, is on a topographic bench about 1,500 feet north of the Columbia River (Figure 4.2-2). Annual average precipitation is estimated to be approximately 10 inches for the southern portion of project area (HDR 2020b). The southern portion of the project area drains directly to the Columbia River, which is the ultimate receiving waterbody for all surface waters in the project vicinity, including those from the northern portion of the project area (via the Klickitat River).

John Day Dam is located on the Columbia River immediately upstream of the proposed project area, creating John Day Pool (Lake Umatilla) on its upstream side (Figure 4.2-2). On the downstream side of the John Day Dam, the proposed project area is adjacent to and traverses The Dalles Pool (Lake Celilo) that is impounded by The Dalles Dam, which is approximately 24 river miles downstream of John Day Dam. The KPUD pump station that would provide water supply for the proposed project is located beside Lake Umatilla. The proposed project's electrical transmission line alignment would cross Lake Celilo. The Columbia River flows generally westward to the Pacific Ocean, approximately 216 miles to the west of the proposed project.

The reach of the Columbia River encompassing Lake Umatilla and Lake Celilo in the project vicinity is designated in Washington for aquatic life uses (spawning/rearing); recreation use (primary contact); domestic, industrial, agricultural, and stock water supply uses; wildlife habitat; harvesting; commercial/navigation; boating; and miscellaneous aesthetics uses. The Oregon Department of Environmental Quality has identified similar designated uses for this portion of the Columbia River (DEQ 2012).

Ecology's current (2016a) U.S. Environmental Protection Agency (USEPA)-approved Water Quality Assessment identifies Lake Umatilla as a Category 5 water (i.e., on the 303(d) list) that is impaired for water temperature, and pesticides and polychlorinated biphenyls (PCBs) in tissue. Lake Celilo is listed as Category 5 for temperature. Lake Umatilla and Lake Celilo are also both impaired and subject to a Total Maximum Daily Load (TMDL) for dioxins in fish tissue, and Lake Celilo is impaired and subject to a TMDL for total dissolved gas in water. Elevated total dissolved gas levels are caused by water-spill events at hydroelectric projects (dams) on the Lower Columbia River. Ecology made no changes to these listings in their draft 2018 Water Quality Assessment (Ecology 2018). Ecology recently adopted amendments to WAC 173.201A.200(1)(f)(ii) that deal directly with total dissolved gas levels at hydroelectric dams, which became effective on January 30, 2020.

Total Maximum Daily Loads (TMDLs)

A TMDL is a calculation that identifies the amount of a pollutant that a river or other waterbody can receive and still meet specific standards developed by a state or Tribe to protect water quality. A TMDL determines a pollutant reduction target and allocates load reductions necessary to the source(s) of the pollutant.

Waterbodies are put into one of five categories, including Category 4 (impaired water that does not require a TMDL) and Category 5 (polluted water that requires an improvement plan, also called the 303(d) list).

In August 2021, USEPA reissued a TMDL for water temperature in the Columbia and lower Snake rivers (USEPA 2021). The TMDL determined that the allowable thermal loading capacity of the Columbia and lower Snake rivers is limited, with a total allowable increase in river temperature of 0.3 °C allocated to all point and nonpoint sources combined. USEPA divided the 0.3 °C allowable loading capacity equally among the river's dam impoundments, NPDES point sources, and tributaries. A reserve allocation for

each reach of the TMDL study areas to accommodate future growth, new sources, and waste load allocation adjustments for existing facilities was also included.

Other available water quality information for the southern portion of the study area is related to toxics/hazardous substances associated with the former CGA smelter cleanup site. Toxics/hazardous substances are addressed in Section 4.10 and the *Environmental Health Resource Analysis Report* (Appendix I). That information is not repeated in this section.

Surface Waterbodies and Wetlands

Table 4-2.1 summarizes the surface waterbodies and wetlands identified in and adjacent to the study area. It also provides classification information, whether these features are connected to other waterbodies or wetlands, and their approximate area within the study area. A more detailed description of these waterbodies and wetlands and a discussion of how they were identified in the study area is provided in the *Surface and Groundwater Hydrology Resource Analysis Report*, in Appendix B, and the *Wetlands and Regulated Waters Resource Analysis Report*, in Appendix C.

Figures 4.2-4, 4.2-5a, and 4.2-5b depict the locations of the identified features relative to the proposed project area.

Table 4.2-1
Surface Waterbodies and Wetlands in the Water Resources Study Area

FEATURE ID[1]	NHD CLASSIFICATION[2]	NWI CLASSIFICATION[3]	FIELD DESCRIPTION	FIELD CLASSIFICATION		SURFACE CONNECTION TO OTHER WATERS?	AREA	
				COWARDIN[4]	HYDROGEOMORPHIC		SQUARE FEET	ACRES
Northern Portion of the Study Area (Swale Creek Watershed/Upper Reservoir Area)								
Stream S7	Perennial water course	R5UBH	Intermittent stream with ephemeral upstream extent	N/A	N/A	Yes	1,990	0.046
Stream S8	Perennial water course	R5UBH	Intermittent stream	N/A	N/A	Yes	1,980	0.045
Stream 1	Not identified	Not identified	Ephemeral stream	N/A	N/A	Yes	773	0.018
Pond/Wetland P1[5]	Perennial pond	PUBHx	Excavated pond with wetland characteristics	PUBFx	Depressional	No	450	0.010
Pond/Wetland P2	Perennial pond	Not identified	Excavated pond with wetland characteristics	PUBCx	Depressional	No	1,160	0.027
Area Subtotal							**6,353**	**0.146**
Southern Portion of the Study Area (Columbia Tributaries Watershed/Lower Reservoir Area)								
Stream S17	Intermittent	R4SBC/PSS1A	Intermittent stream	R4SBJ	N/A	No	1,352	0.031
Stream S24	Not identified	Not identified	Intermittent stream	R4SBJ	N/A	No	2,609	0.060
Stream 2	Not identified	Not identified	Intermittent stream	R4SBJ	N/A	No	663	0.015
Wetland W6	Not identified	Not identified	Herbaceous wetland	PEM1C	Slope	No	123	0.003
Wetland 1	Not identified	Not identified	Scrub-shrub/ herbaceous wetland	PSS/PEM1C	Depressional	Yes	864	0.020
Wetland 2	Not identified	Not identified	Scrub-shrub/ herbaceous wetland	PSS/PEM1C	Depressional	Yes	1,613	0.037
Wetland A	Not identified	Not identified	Herbaceous wetland	PEM1C	Depressional	No	1,202	0.028
Wetland B	Not identified	Not identified	Scrub-shrub wetland	PSS1C	Depressional	No	2,207	0.051
Wetland C	Not identified	Not identified	Herbaceous wetland	PEM1C	Depressional	No	2,120	0.049
Wetland D[6]	Not identified	PEM1Ch	Scrub-shrub wetland	PSS1C	Depressional	No	600,439	13.784
Area Subtotal							**612,292**	**14.078**

FEATURE ID[1]	NHD CLASSIFICATION[2]	NWI CLASSIFICATION[3]	FIELD DESCRIPTION	FIELD CLASSIFICATION		SURFACE CONNECTION TO OTHER WATERS?	AREA	
				COWARDIN[4]	HYDROGEOMORPHIC		SQUARE FEET	ACRES
Aerial Transmission Line Right of Way in Washington State[7]								
Stream S20 (Columbia River/Lake Celilo)[8]	Perennial water course	L1UBHh	Impounded pool of Columbia River	L1UBHh	N/A	Yes	N/A	N/A
Stream S23	Intermittent water course	R4SBC	Ephemeral unvegetated swale	N/A	N/A	No	N/A	N/A
Area Subtotal							**N/A**	**N/A**
Total Area							**618,645**	**14.224**

Notes:

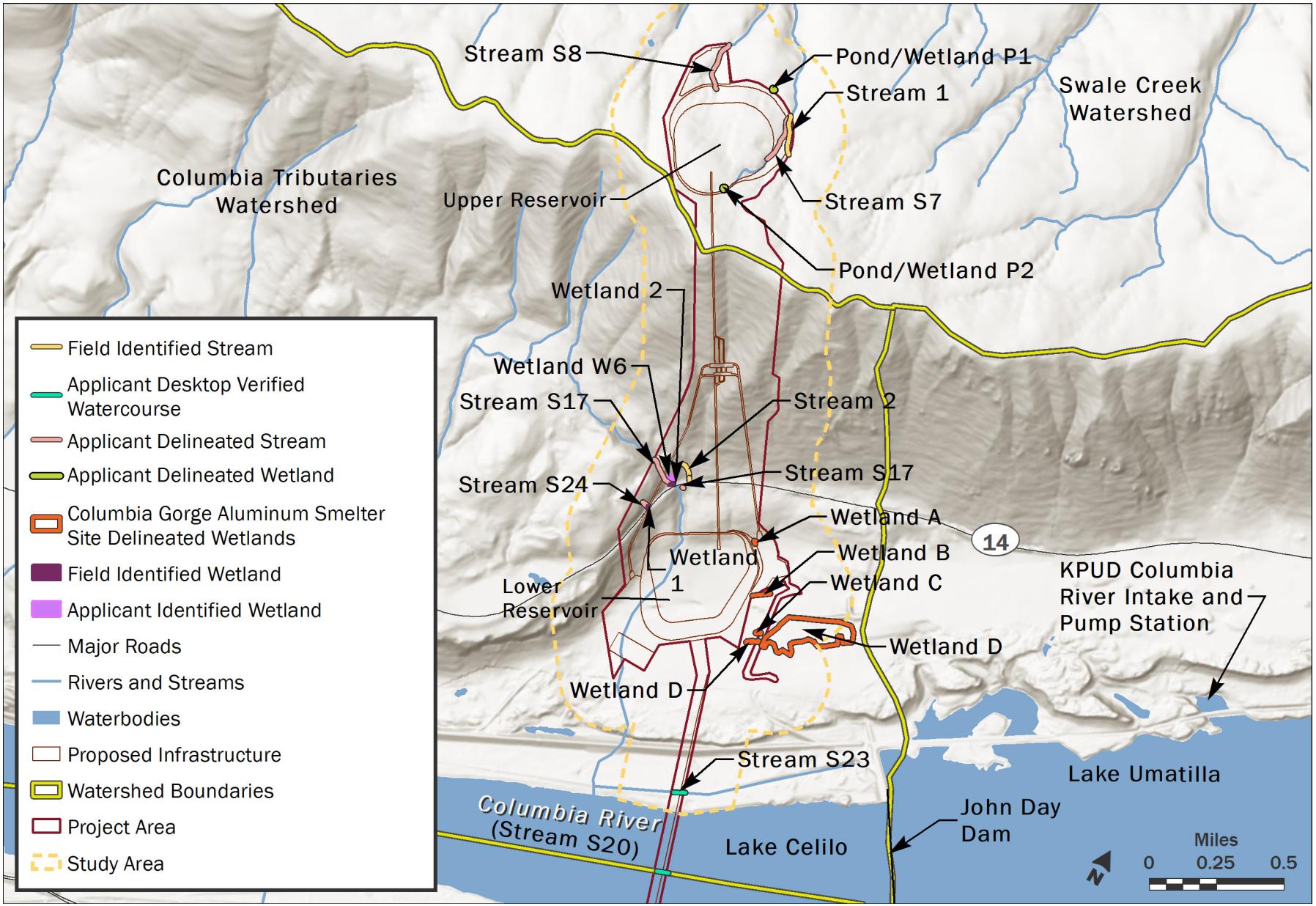
1. Sources: PGG 2013; FFP 2020d, 2021b; July 2021 site visit by Anchor QEA and Ecology (Anchor QEA 2022b). In those studies, wetlands were identified and delineated in accordance with the procedures of the 2008 *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region, Version2.0* (USACE 2008). Regulated waters were identified and delineated based on the presence of a defined ordinary high water mark. Field determination and classification based on the Applicant's 2019 field verification and the 2021 site visit are also presented along with the approximate area of each delineated waterbody.
2. Source: USGS 2021d
3. Source: USFWS 2021a
4. Cowardin system wetland codes:
   L1UBHh: Lacustrine, limnetic, unconsolidated bottom, permanently flooded, diked/impounded
   PEM1C: palustrine, emergent, persistent, seasonally flooded
   PEM1Ch: palustrine, emergent, persistent, seasonally flooded, diked/impounded
   PSS1A: palustrine, scrub-shrub, broad-leaved deciduous, temporary flooded
   PSS1C: palustrine scrub-shrub, broad-leaved deciduous, seasonally flooded
   PSS/PEM1C: palustrine scrub-shrub/palustrine emergent, persistent, seasonally flooded
   PUBCx: palustrine, unconsolidated bottom, seasonally flooded, excavated
   PUBHx: palustrine, unconsolidated bottom, permanently flooded
   PUBFx: palustrine, unconsolidated bottom, semipermanently flooded, excavated
   R4SBC: riverine, intermittent, streambed, seasonally flooded
   R5UBH: riverine, unknown perennial, unconsolidated bottom, permanently flooded
5. Pond/Wetland P1 extends outside of the study area to the north.
6. Wetland D extends outside of the study area to the east.
7. Surface waters in the proposed aerial transmission line right-of-way were assessed using desktop methods and were not verified or delineated in the field.
8. The Columbia River is adjacent to but not within the water resources study area.

N/A: Not applicable

NHD: U.S. Geological Survey National Hydrography Dataset

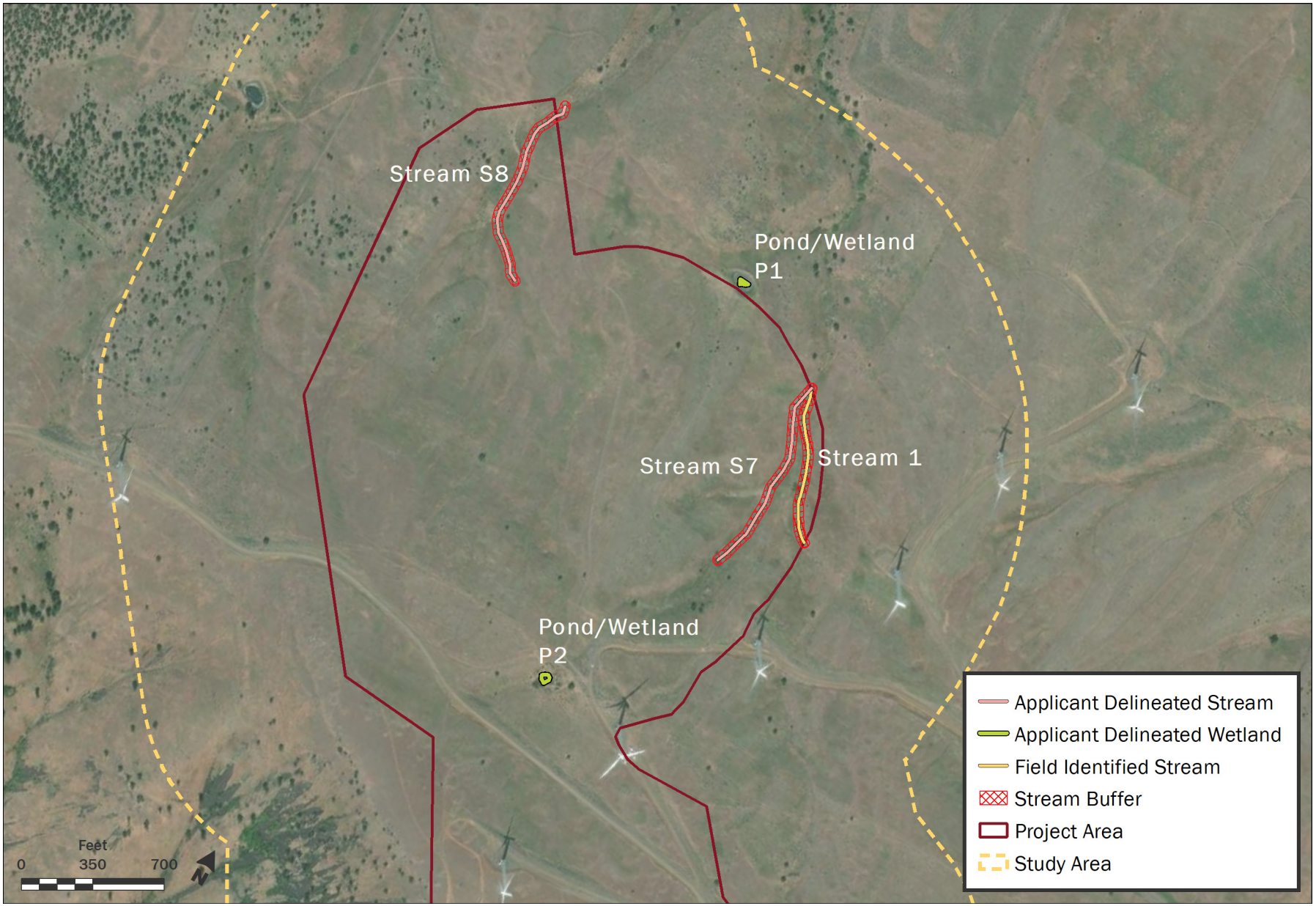
NWI: U.S. Fish and Wildlife Service National Wetlands Inventory

Figure 4.2 4
Location of Surface Waterbodies in the Water Resources Study Area



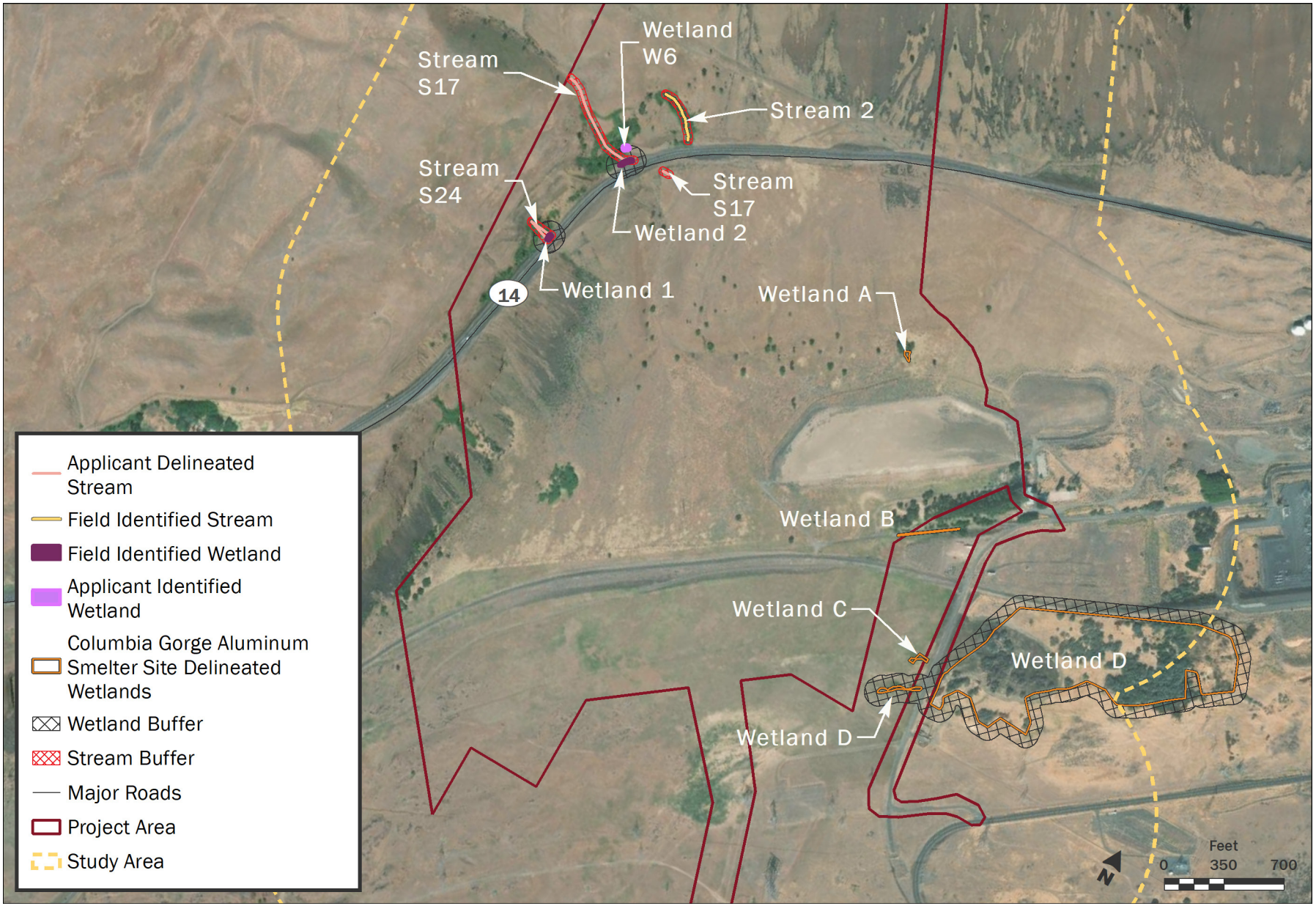
Data Sources: WDNR 2021e; USGS 2021d; FFP 2020d, 2021b; PGG 2013; field knowledge gained through site visits performed by Anchor QEA and Ecology July 2021

Figure 4.2 5a
Wetlands, Regulated Waters, and Buffers in the Northern Portion of the Water Resources Study Area (Upper Reservoir Area)



Data Source: FFP 2021b; field knowledge gained through site visits performed by Anchor QEA and Ecology July 2021

Figure 4.2 5b
Wetlands, Regulated Waters, and Buffers in the Southern Portion of the Water Resources Study Area (Lower Reservoir Area)



Data Sources: FFP 2021b; PGG 2013; field knowledge gained through site visits performed by Anchor QEA and Ecology July 2021

Stream and Wetland Buffers

Buffers are upland areas that surround and protect critical areas. For regulated surface waters, buffer widths are measured horizontally outward from the ordinary high water mark of the surface water. Wetland buffers are measured horizontally outward from the wetland boundary. Wetland buffer widths are based on the wetland size, connectivity to regulated waters, and wetland category per Ecology's *Washington State Wetland Rating System for Eastern Washington: 2014 Update* (Hruby 2014).

Table 4.2-2 summarizes the expected buffer widths for the surface waters and wetlands present in the study area. Additional information on the determination of these buffers is provided in the *Wetlands and Regulated Waters Resource Analysis Report* (Appendix C). The portion of the Columbia River adjacent to the project area is a designated Shoreline of Statewide Significance and has an existing shoreline environment designation of Urban/Industrial and Conservancy in the Klickitat County Shoreline Master Program. The project area would be adjacent to these designations but would not involve any work within shoreline environmental designations, except for adding transmission lines to the existing overhead transmission line, which would not involve work on the ground or in waters.

Protective Buffers

Many of the surface waterbodies and wetlands present in the study area are considered critical areas under the Growth Management Act. Critical areas occurring in the study area are regulated under the Klickitat County Critical Areas Ordinance (Ordinance No. 0080613) or the Klickitat County Shoreline Master Program (Klickitat County 2016, 2019) if the surface water or wetland is determined to be a Shoreline of the State or Shoreline-associated wetland. Both the critical areas ordinance and Shoreline Master Program require the establishment of protective buffers around such areas.

Buffers for non-wetland surface waters (tributaries, streams, rivers, ponds, lakes, and drainageways) that are not Shorelines of the State are based on the WDNR water type in accordance with criteria set forth in WAC.

Table 4.2-2
Wetland and Stream Buffers Within the Study Area

WETLAND	STREAM TYPE[1] OR WETLAND CATEGORY[2]	BUFFER WIDTH (FEET)	BUFFER CONDITIONS	ON SITE BUFFER AREA	
				SQUARE FEET	ACRES
Northern Portion of the Study Area (Swale Creek Watershed/Upper Reservoir Area)					
Stream S7	Ns	25	Shrub-steppe vegetation	49,733	1.142
Stream S8	Ns	25	Shrub-steppe vegetation	49,453	1.135
Stream 1	Ns	25	Shrub-steppe vegetation	39,821	0.914
Pond/Wetland P1[3]	IV	N/A	N/A	N/A	N/A
Pond/Wetland P2[3]	IV	N/A	N/A	N/A	N/A
Area Subtotal				**109,007**	**3.191**
Southern Portion of the Study Area (Columbia Tributaries Watershed/Lower Reservoir Area)					
Stream S17	Ns	25	Shrub-steppe vegetation with invasives; includes a portion of the SR 14 road prism	36,409	0.836
Stream S24	Ns	25	Shrub-steppe vegetation with invasives; includes a portion of the SR 14 road prism	9,427	0.216

WETLAND	STREAM TYPE[1] OR WETLAND CATEGORY[2]	BUFFER WIDTH (FEET)	BUFFER CONDITIONS	ON SITE BUFFER AREA	
				SQUARE FEET	ACRES
Stream 2	Ns	25	Shrub-steppe vegetation with invasives; includes a portion of the SR 14 road prism	17,149	0.394
Wetland W6[4]	IV	N/A	N/A	N/A	N/A
Wetland 1[5,6]	IV	75	Shrub-steppe vegetation with invasives; includes a portion of the SR 14 road prism	18,831	0.432
Wetland 2[5,6]	IV	75	Shrub-steppe vegetation with invasives; includes a portion of the SR 14 road prism	26,240	0.602
Wetland A[3]	IV	N/A	N/A	N/A	N/A
Wetland B[4]	IV	N/A	N/A	N/A	N/A
Wetland C[4]	III	N/A	N/A	N/A	N/A
Wetland D	III	75	Shrub-steppe vegetation; includes portions of gravel and paved access roads associated with the CGA smelter site	323,735	7.432
Area Subtotal				**431,791**	**9.912**
Total Area				**540,798**	**13.103**

Notes:

1. Water type assigned to streams by WDNR in accordance with criteria set forth in WAC 222.16.030. Type Ns is defined as streams that do not have surface flow during at least some portion of the year, and do not meet the physical criteria of a fish-bearing stream (WDNR 2021f).
2. Wetland category assigned based on the *Washington State Wetland Rating System for Eastern Washington: 2014 Update* (Hruby 2014):
    a. Category III Wetland: Wetlands with a moderate level of functions (scores between 16-18 points) that can often be adequately replaced.
    b. Category IV Wetland: Wetland that have the lowest levels of functions (scores less than 16 points) and are often heavily disturbed. They can often be adequately replaced, and in some cases, improved.
3. Pond/Wetlands P1 and P2 and Wetland A are not likely to be regulated for development under the Klickitat County Critical Areas Ordinance because they do not meet the definition of wetlands under RCW 36.70A.030(31) and would not be considered critical areas.
4. Wetlands W6, B, and C are not likely to be regulated for development under the Klickitat County Critical Areas Ordinance due to being isolated wetlands less than 2,500 square feet in size; therefore, buffer requirements do not apply.
5. These wetlands were not formally rated. Categories were assumed based on field observations.
6. Although less than 2,500 square feet in size, these wetlands are connected to streams and therefore are regulated for development under the Klickitat County Critical Areas Ordinance, and buffer requirements apply.

Groundwater

This section summarizes groundwater conditions within the northern and southern portions of the study area. More detailed information on groundwater can be found in the *Surface and Groundwater Hydrology Resource Analysis Report* (Appendix B). Section 4.1, Geology and Soils, provides additional information regarding the proposed project's regional and local geologic settings that affect groundwater conditions.

In general, groundwater conditions in the northern portion of the study area are separate and distinct from those of the southern portion. A conceptual model developed for the area indicates the presence of a hydraulic divide that separates the northern and southern portions as distinct groundwater basins.

Those basins are separated by the Columbia Hills, which are generally interpreted to be a barrier to groundwater flow (Aspect Consulting 2010; HDR 2020b). Groundwater in the basalt aquifers of the northern portion of the study area flows generally westward and groundwater in the basalt aquifers of the southern portion of the study area flows generally southwestward. A groundwater divide separating the two areas' flow directions is inferred based on hydrogeologic principles, but its location is uncertain due to lack of data. The location of a groundwater divide may vary with horizontal location and with depth within the basalt sequence. Given the exposed 2,400-foot-tall basalt face and the documented groundwater seepage along it, as well as a potential flow barrier to the north of the bluff, it is inferred that a greater portion of the groundwater within the areas proposed for the project's underground infrastructure, between the proposed upper and lower reservoirs, flows south toward the Columbia River.

Groundwater in the Northern Portion of Study Area (Swale Creek Watershed)

The northern portion of the study area is in the uppermost headwaters of the Swale Creek watershed, where very limited geologic/hydrogeologic information is available. Information from drilling logs maintained in Ecology's well-log database suggests that that area is underlain by up to 4 feet of unconsolidated materials (sand, gravel, and cobbles) over fractured basalt that extends to depths greater than 40 feet (Ecology 2021b). The sparse existing subsurface information in the area of the proposed upper reservoir indicates that no substantial groundwater is present to a depth of 40 feet.

The primary water-bearing geologic units within the Swale Creek watershed include, from the surface down, the alluvial aquifer in Swale Valley and the underlying basalt aquifer system within the combined Wanapum and deeper Grande Ronde formations. The alluvial aquifer is hydraulically separated from the deeper basalt aquifer zones by massive basalt formations that provide relatively impermeable confining layers between the alluvium and deep basalt aquifers.

Based on groundwater elevation measurements, flow direction in the alluvial aquifer is generally from east to west with discharge to Swale Creek (Aspect Consulting 2010). The Warwick Fault partially restricts groundwater flow in Swale Valley's alluvial aquifer. In Swale Valley just east (upgradient) of the Warwick Fault, Swale Creek is broad and marshy throughout the year, whereas more channelized, less marshy conditions exist west of the fault. These marshy conditions suggest that there is some impoundment of groundwater in the alluvium aquifer, causing it to rise to the surface. Any hydraulic effects of groundwater impoundment from the Warwick Fault do not extend eastward to the subbasin headwaters in the vicinity of the proposed project.

Groundwater within the deeper basalt aquifers beneath the Swale Valley also flows generally east to west. However, roughly 17 miles west of the proposed project, a hydraulic barrier to groundwater flow in the deeper basalts impounds groundwater upgradient (east) of it. As a result of this hydraulic barrier, only a negligible amount of groundwater discharges into Swale Canyon from the deeper basalt aquifer beneath Swale Valley. The majority of groundwater from the deeper basalt aquifer either flows to the northwest into the Little Klickitat subbasin, where it generally discharges to the Little Klickitat River, or it is withdrawn by wells in that area.

Water level monitoring information indicates that Swale Creek and the alluvial aquifer are in direct hydraulic continuity with one another across the aquifer's length in Swale Valley west of Highway 97 (river mile 24; Figure 4.2-3). However, the available information indicates that the basalt aquifers beneath Swale Valley are not in hydraulic continuity with Swale Creek (Aspect Consulting 2010). Based on the lack of groundwater encountered in borings completed to 40 feet near the upper reservoir, and the intermittent/ephemeral nature of the headwater tributaries in that area, there does not appear to be a shallow aquifer (in unconsolidated material) that is in direct hydraulic connection with the tributary surface waters in the upper reservoir area.

Groundwater at depths of less than 150 feet in the Swale Valley has been documented to contain concentrations of nitrate exceeding the state drinking water standard of 10 milligrams per liter (WAC 246.290.310). There is also a strong correlation of elevated nitrate concentrations with chloride concentrations that suggest an association to septic systems. No elevated nitrate concentrations were found in Swale Creek surface waters (WPN 2004). No groundwater quality data was available within approximately 5 miles of the proposed upper reservoir due to the lack of wells in the area, based on Ecology's well-log database (Ecology 2021b). No other groundwater quality information was available or obtained for this portion of the study area.

Groundwater in the Southern Portion of Study Area (Columbia Tributaries Watershed)

Information on groundwater in the southern portion of the study area is primarily from recent documentation prepared for the former CGA smelter cleanup site (Tetra Tech et al. 2015, 2019; HDR 2020b). In the area of the proposed lower reservoir, unconsolidated deposits cover a surface of Grande Ronde basalt. The unconsolidated deposits, consisting of naturally deposited sands, gravel, and silts and manmade fill, appear to be 30 to 50 feet thick in the area surrounding the proposed lower reservoir location but much thinner or absent to the east. These unconsolidated deposits form the shallowest water-bearing zone, generally referred to as the unconsolidated aquifer (UA), which is an unconfined (water table) zone recharged by direct precipitation and by runoff and groundwater inputs from the bedrock bluff immediately to the north as well as historical landslide deposits immediately to the northwest of SR 14.

Groundwater in the UA zone is influenced by the geometry of the underlying bedrock surface and thickness of the unconsolidated deposits. Across the area of the proposed project's lower reservoir, the water table in the UA slopes generally to the southwest. Accordingly, the general groundwater flow direction in the UA is southwest toward the Columbia River (Figure 4.2-6) but groundwater in the UA does not discharge directly to the Columbia River. Rather, some UA groundwater daylights into wetlands identified in the southern portion of the project area (e.g., Wetlands A through D), with the majority discharging downward through fractures into the underlying basalt water-bearing zones (Tetra Tech et al. 2015).

Beneath the UA, the Grande Ronde basalt extends thousands of feet below ground surface and is composed of individual basalt flows ranging in thickness between 50 and 80 feet. Permeable aquifer zones separate individual basalt flows (interflow zones). In the area of the proposed lower reservoir, the shallowest basalt aquifer zone, referred to as the Basalt Aquifer Upper Zone, is at depths roughly 30 to 40 feet below ground surface. Like in the UA, the groundwater flow direction in the Basalt Aquifer Upper Zone is primarily southwest toward the Columbia River. A series of confined aquifer zones occur in deeper basalt interflow zones beneath the Basalt Aquifer Upper Zone (Tetra Tech et al. 2015).

A vertical downward gradient occurs from the UA to the underlying Basalt Aquifer Upper Zone and within the deeper basalt water-bearing zones down to the surface water elevation of the Columbia River. Near that elevation, the gradient becomes less steep as groundwater levels are largely controlled by the lake elevation. The basalt aquifer system flows toward the southwest and discharges directly to Lake Celilo below the waterline or as springs along the bank of the lake.

Figure 4.2 6
Water Table Elevation Contour Map for Southern Portion of the Study Area

Source: GeoPro LLC 2020

Water Use and Water Rights

There are no water uses currently occurring on the proposed project site. With the proposed project, however, water would be supplied from the Columbia River under an existing water right that has been recognized by Ecology for municipal use (including manufacturing, industrial, power, landscape, and other governmental uses that are beneficial uses allowed under municipal water supply purposes). The proposed project is for power generation, which is an approved municipal supply purpose of use. The Applicant plans to purchase water from KPUD. KPUD owns an existing pump station east of the proposed project and a subsurface water conveyance system from the pump station to the project footprint. The proposed project's water supply needs include a one-time withdrawal to complete the initial fill of the pumped storage system (lower reservoir plus conveyance piping), and then, as needed, periodic recharge of the system (make-up water) to offset evaporative and leakage losses from the system.

The Columbia River has been developed into a highly regulated river system, with a variety of federal and state agencies and private utilities operating dams on the river for a variety of uses. The proposed project footprint is adjacent to Lake Celilo, just downstream of John Day Dam, and water supply for the proposed project would be diverted at a pump station adjacent to the Lake Umatilla portion of the Columbia River just upstream of John Day Dam. The existing KPUD intake to the pump station is not in direct connection with surface water. It draws water from the bottom of an infiltration gallery that consists of a 28-foot-deep by 93-foot-wide excavated channel filled with clean gravel that prevents fish from becoming entrained. Water is supplied to the infiltration gallery from an intake pool that is physically separated from the main channel of the Columbia River by a rock and gravel-filled embankment to support the BNSF railroad. Water is drawn from the Columbia River to the intake pond, and then into the infiltration gallery, by seepage through the rock embankment (Rye Development 2021a).

There are three principal water right considerations that could be affected by the proposed project. First, the Instream Resource Protection Program for the Columbia River (WAC 173.563) establishes minimum instream flows for the mainstem of the Columbia River to provide for the preservation of wildlife, fish, scenic, aesthetic, and other environmental and navigational values. The minimum instream flows specify the amount of water needed in a particular place for a defined time, typically following seasonal variations, to protect and preserve instream resources and uses. They effectively serve as a water right for the river and the resources that depend on it. WAC 173.563 establishes minimum instream flows for five management units along the mainstem of the Columbia River, each of which has an associated control station designated for flow monitoring. The U.S. Geologic Survey gage at The Dalles, Oregon (ID No. 14105700), roughly 24 miles downstream of the proposed project footprint, is used to define Columbia River flows in the vicinity of the proposed project.

Second, Columbia River flows are subject to the Biological Opinion issued most recently in July 2020 by the National Oceanic and Atmospheric Administration's National Marine Fisheries Service for the Federal Columbia River Power System to protect threatened and endangered fish species (NOAA Fisheries 2020). The Biological Opinion represents flows necessary to protect salmonids listed under the Endangered Species Act. Although the Biological Opinion is not a water right itself, some water rights on the Columbia River are conditioned to Biological Opinion flows, and the Biological Opinion is a consideration of the public interest when issuing new water rights and considering water right transfers.

Third, existing water rights, including Tribal water rights, must be considered when evaluating potential impacts on the Columbia River associated with new projects. No project can impair existing water rights. Mitigation can be proposed to properly offset such impacts to avoid impairment.

4.2.1 How Impacts Were Analyzed

Existing conditions for water resources in the study area were determined by reviewing information provided by the Applicant or previously generated by the former CGA smelter cleanup process and the Water Resource Inventory Area 30 watershed planning process. Aside from a 2021 observational site visit conducted by Ecology and Anchor QEA, the analysis did not include any additional data collection or modeling. Information on the specific sources used to establish the existing water resource conditions in the study area is provided in the *Surface and Groundwater Hydrology Resource Analysis Report* (Appendix B) and the *Wetlands and Regulated Waters Resource Analysis Report* (Appendix C). Using the existing information, the analysis of potential impacts considered construction- and operation-related effects on wetlands and regulated waters (and their associated buffers), and water quantity, water quality, and water uses and rights for both surface water and groundwater.

Direct impacts on wetlands, regulated waters, and buffers were determined by reviewing mapped resources that occur within the proposed project footprint. Wetland and regulated water impacts determined through these analyses were quantified by their classification types. Indirect impacts resulting from altered subsurface hydrology were qualitatively assessed using mapping of wetlands and geological mapping provided by the Applicant. Impacts on surface and groundwater hydrology, water quality, and water uses and water rights were qualitatively assessed based on their potential to change baseline conditions or conflict with regulatory requirements. Factors considered in this evaluation included the following:

- **Direct and indirect impacts on wetlands and regulated waters:** direct disturbance of a wetland or waterbody or changes that affect the continued existence of those resources in their current form (e.g., hydrologic alteration)
- **Alteration of surface water hydrology:** physical changes to the course of flowing water
- **Alteration of groundwater flow systems:** physical changes to groundwater flow or disruptions of groundwater-surface water interactions
- **Impairment of water supplies/rights:** impairment of water rights or water supplies relied upon by others, including those downstream or downgradient
- **Stormwater quality compliance:** compliance of stormwater quality with water quality permit benchmarks and criteria
- **Water quality compliance in receiving waters:** changes to groundwater or surface water quality including potential impacts from the generation of stormwater and domestic wastewater

Baseline for Technical Review

A key issue in documenting potential impacts of the proposed project on the Columbia River is the baseline condition for comparison.

In this report, the pre-project baseline is connected to an Ecology finding in the 1969 water right authorization S3-00845C, now held by KPUD as part of the Cliffs Water System supplying water to the project, that water was available for appropriation from the Columbia River and would not impair existing water rights or water quality. Each element of the affected environment is evaluated with respect to that baseline condition.

Conversely, the baseline condition for Swale Creek is the existing environment because no mitigation is proposed by the Applicant for that drainage.

The potential effects on water quality from the handling of contaminated materials (e.g., proposed removal of WSI) and any potential for releases from other areas of existing contamination within the CGA smelter cleanup site are addressed in Section 4.10 and the *Environmental Health Resource Analysis Report* (Appendix I). Cumulative impacts are addressed according to Section 404 of the Clean Water Act (CFR 40.230.11[g]), in Chapter 6. Any potential changes related to water resources due to climate change are discussed in Chapter 5.

4.2.2 Findings for the Proposed Project

4.2.2.1 Impacts from Construction

Direct Impacts from Construction

Wetlands and Regulated Waters

Wetlands and streams in the study area would be directly and permanently affected by land clearing, excavation, grading, and fill placement activities during construction. Permanent impacts include those that would completely remove or alter a resource. Temporary construction impacts on surface waters would occur in construction staging areas and would include the removal and disturbance of soil and vegetation by use of equipment and material stockpile placement. Following completion of construction, surface water resources affected by temporary construction activities would be returned to pre-project conditions.

Table 4.2-3 and Figures 4.2-7a and 4.2-7b summarize the expected permanent and temporary impacts on wetlands, regulated waters, and regulated buffers from construction of the proposed project. Construction impacts on existing surface waters, wetlands, and buffers would not result in significant adverse impacts on those resources. The direct impacts are further summarized as follows:

- Construction impacts on surface waters would include permanent impacts on approximately 0.044 acre of intermittent streams (Stream S7, Stream S8, and Stream 1) and 0.004 acre of ephemeral streams (Stream 1). Temporary impacts on 0.037 acre of intermittent streams (Stream S8) would also occur. A significant impact would be defined as a permanent change in stream function or type and/or permanent loss of 0.5 or more acres of stream channel.
- Construction impacts on wetlands would include permanent impacts on approximately 0.042 acre of Category IV wetlands (Pond/Wetland P2 and Wetland A) and temporary impacts on approximately 0.022 acre of Category IV wetlands (Wetland A and Wetland B). A significant impact would be defined as a permanent change in wetland function or type and/or permanent loss of 0.5 or more acres of Category I wetlands, 5 or more acres of Category II wetlands, and/or 10 or more acres of Category III or IV wetlands.
- Construction impacts on buffers of wetlands and regulated water would include permanent impacts on 1.395 acres of stream buffer (around Stream S7, Stream S8, and Stream 1) and temporary impacts on 0.886 acre of stream buffer (around Stream S8). Wetlands A or B are likely to be considered critical areas under RCW 36.70A.030(31) and do not have assigned regulatory buffers. A significant impact would be defined as permanent loss or change in type or function of 10 or more acres of other water buffers.

The proposed underground access tunnel would be constructed at a sufficient depth to avoid impacts on Wetlands W6, 1, and 2. Because no ground-disturbing work would occur within the shorelands area of the Columbia River, there would be no impacts on shorelines of the state or associated shorelands.

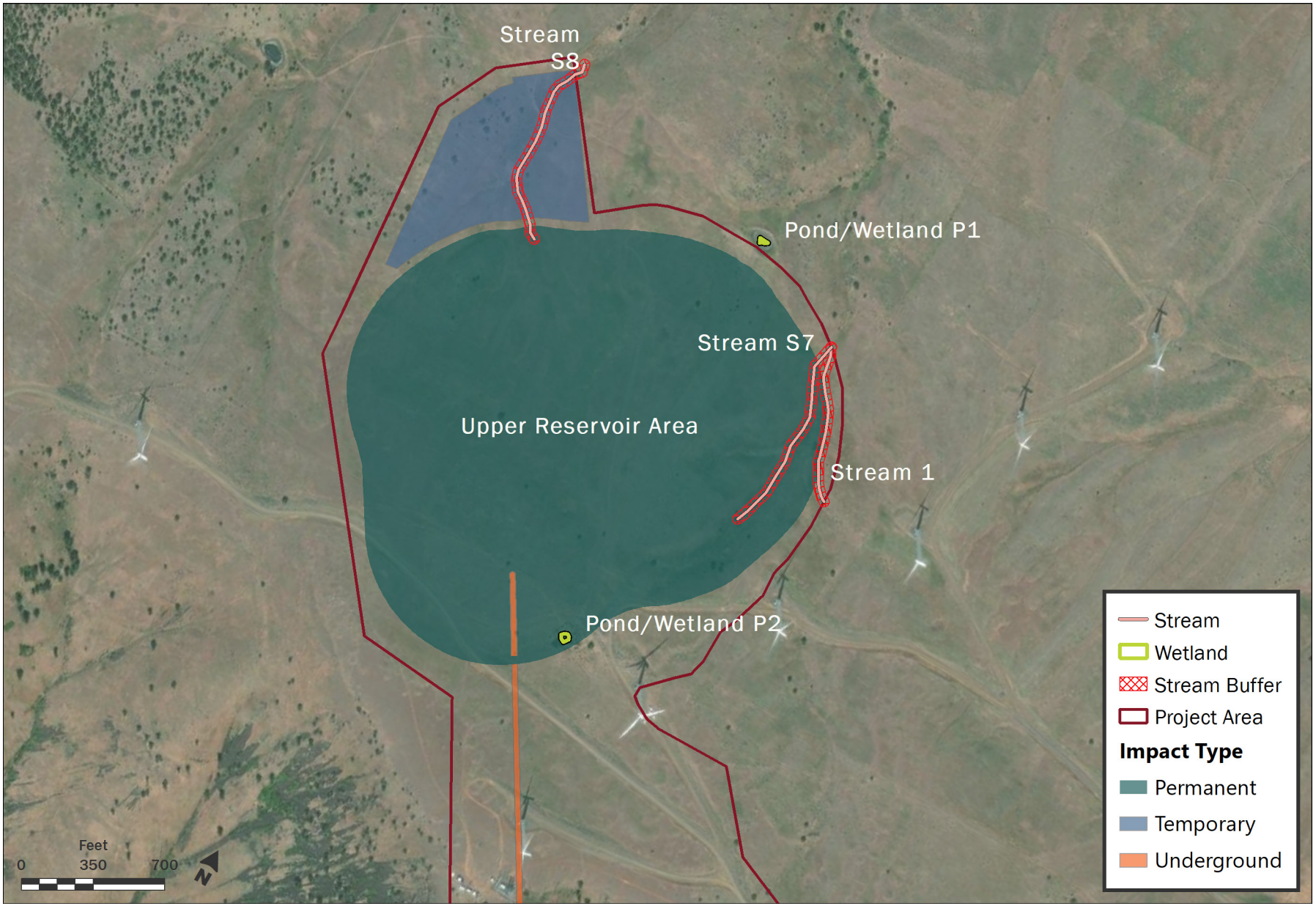
Table 4.2-3
Direct Impacts on Surface Waters, Wetlands, and Buffers from Proposed Project Construction

WETLAND/ WATER	WETLAND CATEGORY/ WATER TYPE[1,2]	CAUSE OF IMPACT	DURATION OF IMPACT	AREA OF IMPACT		AREA OF BUFFER IMPACT	
				SQUARE FEET	ACRES	SQUARE FEET	ACRES
Northern Portion of the Study Area (Swale Creek Watershed/Upper Reservoir Area)							
Stream S7	Ns	Construction of the upper reservoir would result in excavation and backfilling portions of Stream S7 and its buffer area.	Permanent	1,785	0.041	43,805	1.006
Stream S8	Ns	Portions of Stream S8 and its buffer area would be affected by temporary laydown areas for stockpiling upper reservoir excavated materials.	Temporary	1,610	0.037	38,607	0.886
		Construction of the upper reservoir would result in excavation and backfilling portions of Stream S8 and its buffer area.	Permanent	142	0.003	4,373	0.100
Stream 1	Ns	Construction of the upper reservoir would result in excavation and backfilling portions of Stream 1 and its buffer area.	Permanent	189	0.004	12,574	0.289
Pond/ Wetland P1	IV	N/A	N/A	0	0	N/A	N/A
Pond/ Wetland P2	IV	Construction of the upper reservoir would result in excavation and backfilling of all Pond/Wetland P2.	Permanent	1,160	0.027	N/A	N/A
Area Subtotal				**4,886**	**0.112**	**99,359**	**2.281**
Southern Portion of the Study Area (Columbia Tributaries Watershed/Upper Reservoir Area)							
Stream S17	Ns	N/A	N/A	0	0	0	0
Stream S24	Ns	N/A	N/A	0	0	0	0
Stream 2	Ns	N/A	N/A	0	0	0	0
Wetland W6	IV	N/A	N/A	0	0	N/A	N/A
Wetland 1	IV	N/A	N/A	0	0	0	0
Wetland 2	IV	N/A	N/A	0	0	0	0
Wetland A	IV	Construction of the lower reservoir would result in excavation and backfilling a portion of Wetland A.	Permanent	658	0.015	N/A	N/A
		Portions of Wetland A would be affected by temporary laydown areas for stockpiling excavated materials near the lower reservoir.	Temporary	578	0.013	N/A	N/A

WETLAND/ WATER	WETLAND CATEGORY/ WATER TYPE[1,2]	CAUSE OF IMPACT	DURATION OF IMPACT	AREA OF IMPACT		AREA OF BUFFER IMPACT	
				SQUARE FEET	ACRES	SQUARE FEET	ACRES
Wetland B	IV	Portions of Wetland B would be affected by temporary laydown areas for stockpiling excavated materials near the lower reservoir.	Temporary	391	0.009	N/A	N/A
Wetland C	III	N/A	N/A	0	0	N/A	N/A
Wetland D	III	N/A	N/A	0	0	0	0
Area Subtotal				**1,627**	**0.037**	**0**	**0**
Total Area				**6,513**	**0.149**	**99,359**	**2.281**

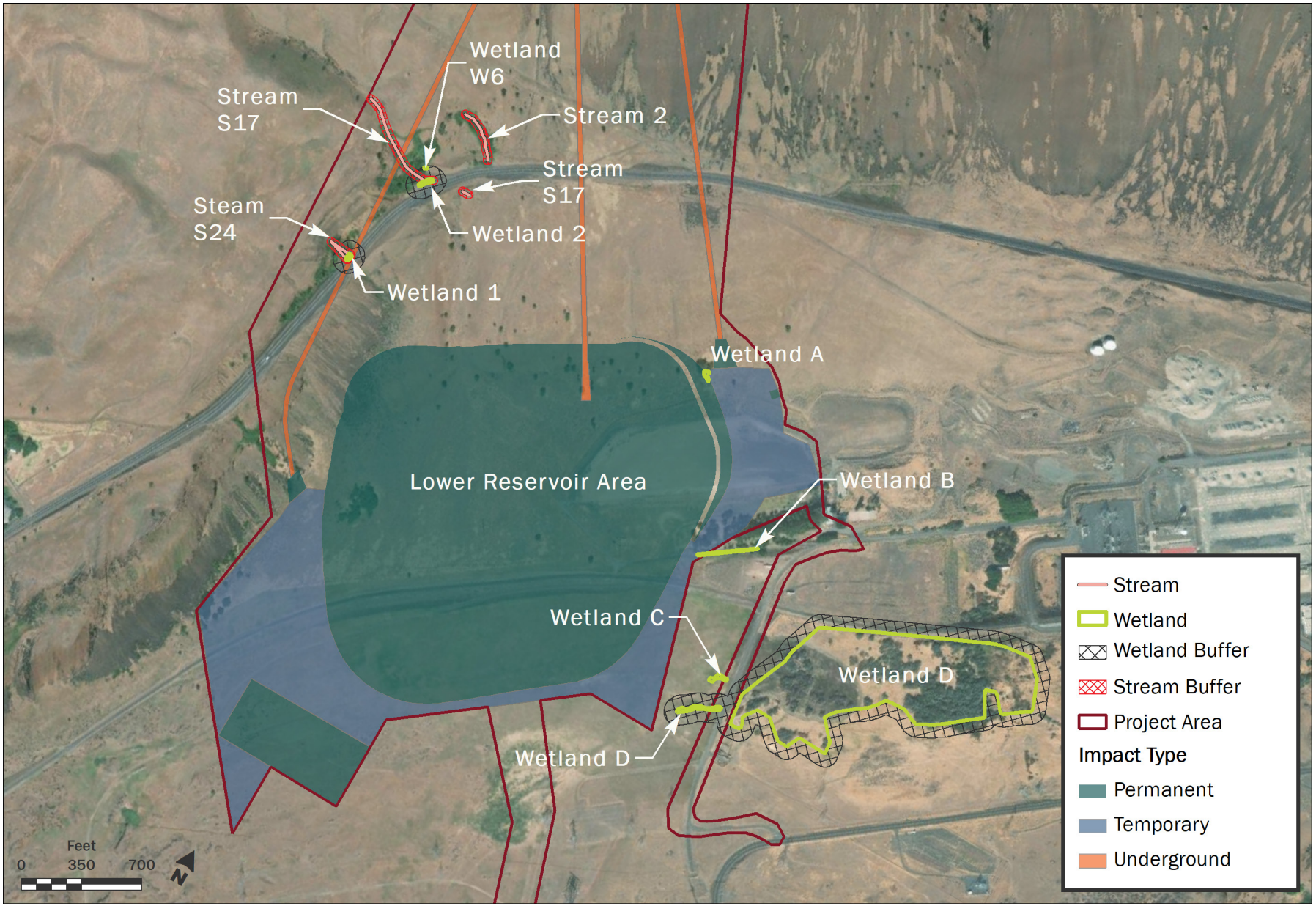
Notes:
N/A: Not applicable either because there is no impact or there is no resource (e.g., buffer) that would be affected.
1. Wetland category based on *Washington State Wetland Rating System for Eastern Washington: 2014 Update* (Hruby 2014).
2. WDNR Water Type Ns is defined as streams that do not have surface flow during at least some portion of the year, and do not meet the physical criteria of a fish-bearing stream (WDNR 2021f).

Figure 4.2 7a
Direct Impacts on Surface Waters, Wetlands, and Buffers from Proposed Project Construction in Northern Portion of the Study Area



Data Sources: FFP 2021b; field knowledge gained through site visits performed by Anchor QEA and Ecology July 2021

Figure 4.2 7b
Direct Impacts on Surface Waters, Wetlands, and Buffers from Proposed Project Construction in Southern Portion of the Study Area



Data Sources: FFP 2021b; PGG 2013; field knowledge gained through site visits performed by Anchor QEA and Ecology July 2021

Mitigation is not required to reduce any significant impacts, but compensatory mitigation for impacts on wetlands and waterbodies will be required through permitting. The identified impacts could also be reduced if the Applicant develops a mitigation plan that meets regulatory requirements and for which implementation is feasible (see Section 4.2.2.3). There would not be a significant adverse impact on surface waters, wetlands, and buffers.

Alteration of Surface Water Hydrology

Construction impacts to surface water hydrology are summarized as follows:

- **Northern Portion of Study Area:** As discussed in the previous section, construction of the upper reservoir would result in the permanent loss of portions of Stream S7, Stream S8, Stream 1, and all of Pond/Wetland P2. Stream S8 would also be subject to temporary impacts for the duration of the construction period. Stream S7, Stream S8, and Stream 1 all provide either intermittent or ephemeral drainage to Swale Creek. As a result, their loss could reduce the volume of surface flows to Swale Creek. However, given that they drain only a small portion of the 54,200-acre Swale Creek watershed, such impacts would be minimal. Pond/Wetland P2 has no surface outlet and is not connected to any other waterbody.

- **Southern Portion of the Study Area:** As discussed in the previous section, construction of the lower reservoir would result in permanent impacts on a portion of Wetland A, and temporary impacts on Wetlands A and B. Neither of those wetlands is connected to other surface waters and therefore the impacts are not expected to affect surface water hydrology outside of the immediate areas of impact.

  KPUD's Cliffs Water System would provide all water supply for project construction under its existing municipal water right (certificate S3-00845C) with a priority date of March 19, 1969. That water right authorizes a maximum instantaneous rate of 35.3 cubic feet per second and annual total withdrawal quantity of 13,911 acre-feet per year (AFY), which includes a maximum consumptive use of 4,861 AFY. This includes the very large initial fill of the system that would occur near the end of the construction period (likely between October to March).

  The Cliffs water right predates and is senior to the adoption of the Columbia River instream flow rule in 1980. Therefore, water supply for project construction would not result in any new impacts on the Columbia River or other surface waters within the southern portion of the study area. This assumes that the initial fill of the proposed project system would occur across a 2-year period to comply with the annual maximum consumptive use quantity of the underlying water right.

  Ecology has approved multiple changes requested by KPUD to the original certificate, including a 2002 change expanding the place of use (CS3-00845C@1) and a 2006 change from industrial to municipal purpose, both of which were processed by the Klickitat County Water Conservancy Board. In addition, following placement of the right into the State of Washington's Trust Water Right Program by KPUD, Ecology approved its use for mitigation of impacts to the Columbia River associated with new water-budget-neutral water rights. These included S4-35068 issued to the City of White Salmon in 2010, G4-33184 issued to 101 Bar Ranch LLC in 2016, and G4-35220 issued to KPUD (Roosevelt groundwater right) in 2015. However, use of the Cliffs municipal water right for mitigation purposes in each of these cases has been cancelled, such that the full quantity of the Cliffs water right is available to meet water supply needs of the proposed project.

Apart from permanent and temporary impacts on streams and wetlands within the upper reservoir area and water supply for the initial fill of the system that would occur under KPUD's existing municipal water right authorization, no impact on surface water hydrology within the study area is anticipated during

construction of the proposed project. There would not be a significant adverse impact on surface water hydrology.

Alteration of Groundwater Flow Systems

The currently available information suggests that dewatering will be required during construction of the proposed lower reservoir and underground infrastructure, but not during construction of the proposed upper reservoir. Water generated during dewatering for construction of the underground water conveyance and power generation infrastructure would be conveyed to the lower reservoir construction area where it would be managed and treated to meet permit requirements using settlement and infiltration ponds and mobile treatment equipment as needed. Construction impacts to groundwater flow are summarized as follows:

- **Northern Portion of Study Area:** The sparse existing subsurface information for the proposed upper reservoir area indicates that no substantial groundwater is present to a depth of 40 feet, which suggests that dewatering may not be needed during reservoir construction. However, additional information is needed to verify subsurface conditions specific to the upper reservoir footprint. If dewatering is required to construct the upper reservoir, the potential effects on the groundwater flow system would be conceptually the same as outlined in for the lower reservoir area. Any temporary disruption to groundwater flow and discharge quantities from dewatering at the upper reservoir location would occur in the alluvial aquifer. Such impacts would affect the headwater reaches of Swale Creek that are ephemeral or intermittent, non-fish-bearing, and located greater than 15 miles upstream of fish-bearing waters in Swale Canyon. Construction would not be anticipated to result in any impacts on the basalt aquifer system of the Swale Creek watershed that are adjacent to or downgradient of the proposed project footprint.

- **Southern Portion of the Study Area:** The base of the lower reservoir would be constructed at an elevation of approximately 420 feet, indicating excavation and structures would extend beneath that elevation. Based on available information, the northern portion of the lower reservoir's base would extend beneath the UA water table but would not extend through the full saturated thickness of the UA. As such, temporary dewatering or upgradient cutoff of UA groundwater would be required to complete the excavation, subgrade preparation, concrete placement work, and liner system installation for the lower reservoir.

  Within the bedrock bluff north of the lower reservoir, tunneling and excavation to construct the extensive underground water conveyance and power generation infrastructure would need to dewater groundwater from multiple basalt interflow zones across the approximately 2,400-foot elevation interval. It is uncertain what proportion of groundwater in those basalts provides recharge to the UA—by direct discharge at the toe of the slope or by discharge as springs on the bluff that become runoff reaching the UA—versus recharging the deeper basalt zones in the lower reservoir area. The Applicant has not estimated rates/quantities of groundwater to be dewatered during these construction activities but provided a preliminary assumption for tunnel dewatering of 50 gallons per minute per 100 feet of tunnel being constructed. Approximately 10,000 linear feet of tunnel, penstocks, and vertical shaft comprise the conveyance system, but dewatering would be limited to a localized portion of the conveyance alignment at any one time as construction proceeds. The quantity of dewatering is not yet estimated by the Applicant. However, the Applicant noted that they would conduct additional geotechnical/hydrogeologic investigation along the tunnel alignments and reservoir footprints to assess dewatering needs and methods as part of the project design process.

  The planned construction dewatering would create a temporary alteration of the UA groundwater flow system in the immediate area of activity, creating drawdown that diverts the natural flow of

groundwater toward the dewatering location. Drawdown effects would dissipate at increasing distance from the dewatering location. The drawdown created would temporarily draw in contaminated groundwater (within that portion of the CGA smelter cleanup site) from an area predominantly northeast (upgradient), and to a lesser extent from the east and west, of the reservoir footprint being excavated. The dewatering would also create a temporary reduction in the quantity of groundwater reaching its existing discharge location that, depending on location of dewatering relative to the UA flow system, is either springs or Lake Celilo surface water. The effects of the change on the local groundwater-surface water system would depend on how the captured groundwater is managed (e.g., infiltration to the UA versus piped discharge to Lake Celilo). Returning the dewatered groundwater to the UA via infiltration downgradient of the construction footprint could minimize the temporary effects on the existing groundwater discharge areas.

Mitigation is not required to reduce significant impacts, but monitoring programs will be required by permits. The Applicant would further assess dewatering needs and management of that water for the entire proposed project area based on the results of additional subsurface investigations along the tunnel alignments and reservoir footprints during final design of the proposed project. The Applicant has proposed to include hydrologic/groundwater level monitoring as a component of a broader water quality monitoring plan, prepared in coordination with Ecology during the permitting process. Any such program would need to include pre-construction baseline monitoring to have a basis to assess changes.

With appropriate water management (e.g., infiltration of the extracted and treated water to minimize loss of the groundwater resource), control measures, and monitoring programs in place, impacts of the temporary construction-related alteration to groundwater flow patterns and potential downgradient effects at corresponding groundwater discharge locations would be expected to be further reduced. There would not be a significant adverse impact on groundwater systems.

Impairment of Water Supplies and Water Rights

Construction of the proposed project would not involve withdrawal or diversion of any water from the northern portion of the study area.

As discussed in the prior section on surface water hydrology, water used for construction would be supplied by KPUD's Cliffs Water System under its existing municipal water rights. That water right authorizes a maximum annual consumptive use quantity of 4,851 AFY. Water supply demand for the project throughout construction includes aggregate processing, production of concrete, and dust control. It also includes the large initial fill of the lower reservoir and conveyance system near the end of the construction period. The Applicant has estimated an initial fill quantity of 7,640 acre-feet occurring over approximately 6 months; the Applicant has not estimated water supply quantity required for the earlier, smaller-demand construction activities. Water demands during construction are largely consumptive uses; however, these quantities are anticipated to be relatively small and can be fully covered under the Cliffs municipal water right. The Applicant would need to coordinate with KPUD to ensure that, during the year that the initial fill begins, the total quantity of water supplied to the project for project construction plus the initial fill does not exceed quantities permitted by their water right. KPUD supplying water for construction would not result in new waters being appropriated from the Columbia River.

Assuming that the initial fill of the system occurs across a 2-year period to comply with the consumptive use quantity authorized by the KPUD water right, no impact on water supplies/rights would occur during project construction, including promulgated instream flow minimums.

Stormwater Quality Compliance

The large-scale earthwork associated with construction of the reservoirs and ancillary facilities would increase the potential for mobilization and transport of suspended sediment (turbidity) into surface waters. The introduction of construction vehicles, equipment, and materials would also increase the potential for pollutants (e.g., oil and grease, hydraulic fluids, and metals) to enter surface waters through stormwater runoff. This includes aboveground tanks to store fuel for equipment and any diesel generators that are used. In addition, the establishment and operation of temporary facilities to process excavated aggregate/rock materials and to manufacture concrete would increase the potential for sediment and pollutant entry into surface waters through stormwater runoff and process wastewater discharges. Water that has been in contact with cementitious materials used in concrete production would present a potential for introducing high-pH discharges to surface waters, thereby elevating instream pH levels.

The permits required for the proposed project, including the 401 Water Quality Certification and NPDES Construction Stormwater General Permit, would require the permittee to develop, implement, monitor, and maintain a number of construction BMPs to comply with water quality standards and other permit requirements. The planned on-site production of concrete would trigger an NPDES Sand and Gravel Permit issued by Ecology, which would require implementation of BMPs and targeted monitoring to control pH and other pollutants from process water and stormwater.

Because construction of the proposed lower reservoir would involve excavation and handling of contaminated materials from a portion of the former CGA smelter cleanup site, Ecology would issue a site-specific Administrative Order on the Construction Stormwater General Permit for the proposed project. In addition to standard requirements of the Construction Stormwater General Permit, the Administrative Order would establish indicator levels for known contaminants of concern at the cleanup site, and require capture and treatment of all contaminated dewatering water or contaminated stormwater generated prior to discharge. It would also require rigorous monitoring and reporting of the monitoring data to Ecology to ensure that all water discharged to receiving waters complies with the indicator levels.

Monitoring of pH in waters discharged would also be required to meet requirements of the Sand and Gravel General Permit. Given the site-specific flexibility afforded under an Administrative Order for the Construction Stormwater General Permit, Ecology could potentially incorporate applicable materials management and monitoring requirements of the Sand and Gravel General Permit into the Administrative Order for the Construction Stormwater General Permit.

Mitigation is not required to reduce significant impacts, but appropriate control measures and monitoring programs will be required by permits. The temporary construction-related increases in turbidity and pollutant discharges in stormwater runoff would not result in a significant adverse impact to stormwater.

Water Quality Compliance in Receiving Waters

This section addresses potential water quality impacts associated with construction dewatering, distinct from construction stormwater runoff described in the preceding section. As stated previously, it is not known whether dewatering would be required during construction of the upper reservoir. If dewatering is required, requirements for managing and monitoring construction stormwater management would also be applied to dewatering water under the terms of the Construction Stormwater General Permit.

It is assumed that the Applicant would use settling pond(s) and infiltration pond(s) to manage and discharge water generated during construction dewatering for the lower reservoir. Infiltration is a BMP for treating water discharges that mimics natural processes. Specific areas for management and infiltration of dewatering water are not currently defined by the Applicant. Dewatering in the lower reservoir area

would generate groundwater contaminated with sulfate, fluoride, and possibly cyanide that exists in that portion of the former CGA smelter cleanup site. The dewatering would temporarily draw in groundwater from a broader area predominantly northwest, but also to the east and west, of the reservoir footprint being excavated. As such, the dewatering action would achieve permanent removal of groundwater contaminant mass and thereby accelerate the restoration time frame for groundwater in that immediate area to some degree.

Management of dewatering water would be regulated with construction stormwater under a site-specific Administrative Order on the Construction Stormwater General Permit. This is because construction of the proposed lower reservoir would involve handling of contaminated materials including dewatering of contaminated groundwater at the former CGA smelter cleanup site, and infiltration of construction-generated water would occur within or proximal to the cleanup site boundary.

With appropriate control measures and monitoring programs in place and as required by permits, the temporary discharge of dewatering water must meet water quality benchmarks, and therefore would not result in a significant adverse impact on water quality in receiving waters. In addition to meeting permit requirements, the Applicant is proposing to prepare and implement a water quality monitoring plan, prepared in coordination with Ecology during the permitting process, that would address areas where dewatering water would be managed. There would not be a significant adverse impact on water quality.

Indirect Impacts from Construction

Excavation and dewatering for construction of the reservoirs may affect shallow groundwater hydrology, which could result in indirect impacts on wetlands and regulated waters in the vicinity. Excavation of the reservoirs may direct shallow groundwater into the excavated areas, potentially affecting the supporting hydrology for nearby wetlands and regulated waters. Such impacts could increase if the excavations are actively dewatered. The wetland areas that are most likely to be affected by such impacts include Pond/Wetland P1, which is located adjacent to the upper reservoir, and Wetland B, which is located adjacent to the lower reservoir. Although these impacts could occur throughout the duration of the 5-year construction period, they would not constitute a significant adverse impact because they are unlikely to result in the permanent loss of wetlands or wetland functions. In addition, the effects of such dewatering could be minimized by implementation of BMPs within permit requirements to comply with water quality standards.

Construction of the underground portions of the project could also cause indirect impacts on wetlands and regulated waters. The proposed multi-use tunnels would be installed beneath Wetland W6, Wetland 1, Wetland 2, Stream S24, Stream S17, and Stream 2. The tunnels would be installed using tunneling techniques and would not involve disturbance of the ground surface in those locations. The tunnels would ultimately be lined and impermeable. As the tunnels are being constructed, however, there is a minor potential for surface water to infiltrate into the tunnels and drain wetlands and streams on the overlying surface. The tunnels would be located approximately 1,050 feet below the ground surface of those wetlands and streams and the underlying geology includes approximately 1,000 feet of Grande Ronde basalt (HDR 2020b). Given the depth of the tunnels and the thickness of basalt separating them from the wetlands and streams on the surface, tunnel construction is highly unlikely to affect shallow groundwater in those wetlands and streams.

Indirect impacts on wetland and stream buffers may result from changes to adjacent habitat directly affected by the proposed project. These impacts are not expected to degrade buffer function because the regulated buffer widths are small, and the existing habitat is degraded with invasive species or human development. These effects may also result in reduced hydrology in the sections of Stream S7, Stream S8, and Stream 1 that extend downstream of the study area.

Indirect impacts on surface and groundwater resources during construction of the proposed project may include increased demand on water supplies associated with short-term housing for workers during the construction phase. It is anticipated that much of the demand would be borne by existing municipal supplies in surrounding communities (e.g., City of Goldendale) and therefore would not result in a significant adverse impact. No indirect impacts on other water resource elements are identified.

4.2.2.2 Impacts from Operation

Direct Impacts on Wetlands and Regulated Waters

Operation of the proposed project would involve periodic pumping of water into the upper reservoir and discharging that water through the underground headrace, powerhouse, and tailrace to the lower reservoir. Operations would not involve any land disturbance. The reservoirs and tunnels would all be lined with an impermeable material, which would minimize changes to surface and subsurface drainage. As such, operation of the proposed project is not expected to affect wetlands, streams, and their buffers. No shorelines of the state would be affected by project operation.

Alteration of Surface Water Hydrology

Tables 4.2-4a through 4.2-4c present a water balance analysis to estimate the changes to hydrology that would result from the proposed reservoirs capturing precipitation that would otherwise fall on the ground and either infiltrate or run off into surface waters. The assumptions and rational for this approach are further discussed in the *Surface and Groundwater Hydrology Resource Analysis Report* (Appendix B). Changes to surface hydrology for the northern and southern portions of the study area are discussed after the water balance tables.

Table 4.2-4a
Subbasin-Scale Water Balance for Swale Valley

SUBBASIN AREA	INPUTS		OUTPUTS						
	PRECIPITATION		EVAPOTRANSPIRATION (NON IRRIGATION)		RECHARGE TO GROUNDWATER	RUNOFF TO STREAMFLOW		IRRIGATION	
								CONSUMPTIVE USE	RETURN FLOW
ACRES	INCHES	AFY	INCHES	AFY	AFY	CFS	AFY	AFY	AFY
54,200	23	103,883	17.8	77,980	15,808	8	5,502	5,186	-593
		As % of precipitation:		75%	15%		5%	5%	-0.6%
		Reapportioned % with no irrigation:		79%	16%		6%	NA	NA

Source: Aspect Consulting 2010
cfs: cubic feet per second

Table 4.2-4b
Baseline Condition for Upper and Lower Reservoir Areas (No Action Alternative)

RESERVOIR	RESERVOIR AREA	PRECIPITATION		EVAPOTRANSPIRATION (NON IRRIGATION)		RECHARGE TO GROUNDWATER		RUNOFF TO STREAMFLOW		RECHARGE PLUS STREAMFLOW
	ACRES	INCHES	AFY	AS % OF PRECIP	AFY	AS % OF PRECIP	AFY	AS % OF PRECIP	AFY	AFY
Upper	61	17	86	79%	68	16%	14	6%	5	19
Lower	63	10	53	79%	41	16%	8	6%	3	11

Table 4.2-4c
Proposed Project Operating Condition

RESERVOIR	RESERVOIR AREA	RECHARGE PLUS STREAMFLOW CAPTURED (EVAPORATED)	100 AFY UNDERGROUND LEAKAGE (RETURN FLOW INTO BASALT AQUIFER)		NET GAIN TO/LOSS FROM EACH SUBBASIN
	ACRES	AFY	ASSUMED % INTO EACH SUBBASIN	AFY	AFY
Upper	61	−19	30%	30	11
Lower	63	−11	70%	70	59
Total	**124**	**−30**		**100**	**70**

Using the water balance presented in Table 4.2-4a, the estimated average annual quantities (in AFY) of evapotranspiration occurring outside of irrigated areas, recharge, runoff (streamflow), irrigation consumptive use, and irrigation return flow were converted to percentages of precipitation. Because there is no irrigation water use within the reservoir footprints, those percentages were then reapportioned to evapotranspiration occurring outside of irrigated areas (79%), recharge to groundwater (16%), and runoff to streamflow (6%; Table 4.2-4b). Those percentages represent the baseline condition (i.e., the No Action Alternative).

During proposed project operations, it is assumed that negligible seepage would occur from the lined reservoirs, but approximately 100 AFY of leakage would occur from the underground infrastructure (piping, etc.) that will be located within the basalt between the two reservoirs. That underground leakage would represent return flow (artificial recharge) into the basalt aquifer system and, as such, is included in the water balance for the proposed project operating conditions. For purposes of this analysis, it is assumed that 70% (or approximately 70 AFY) of the assumed underground leakage would enter the Columbia River Tributaries watershed and 30% (30 AFY) would enter the Swale Creek watershed. The proposed lower reservoir is located within the Columbia Tributaries watershed, not Swale Creek watershed. A subbasin-scale water balance, similar to the one prepared for Swale Valley, has not been conducted for the Columbia Tributaries watershed as part of the Water Resource Inventory Area 30 watershed planning process. Therefore, for purposes of this analysis, the evapotranspiration, recharge, and runoff percentage estimated for Swale Valley were also applied to the lower reservoir area.

Using these assumptions, the net gain and loss was calculated for each subbasin (Table 4.2-4c), and impacts are discussed as follows:

- **Northern Portion of Study Area:** The proposed 61-acre upper reservoir would capture precipitation and thus permanently reduce stormwater runoff from the northern portion of the study area, some percentage of which would otherwise reach intermittent Stream S7, Stream S8, and Stream 1, which are tributaries to Swale Creek. Assuming 17 inches average annual precipitation, this equates to approximately 86 AFY of water captured by the upper reservoir. This amount is a component of the make-up water that would be required for the proposed project's potential losses through evaporation and leakage.

  The baseline percentages for evapotranspiration, recharge, and runoff were applied to the 86 AFY of precipitation falling within the upper reservoir to estimate the volume of groundwater recharge and runoff to streamflow that would be lost to the hydrologic system by the reservoir's capture of precipitation. Using percentages provided in Table 4.2-4b, the estimated amount of groundwater recharge lost would be 14 AFY and the estimated amount of runoff to streamflow lost would be 5 AFY. Based on the net gain to and loss determination presented in Table 4.2-4c, the estimated 30 AFY of artificial recharge from underground leakage would more than offset these amounts. As such, no impacts on surface water hydrology are expected to occur in the northern portion of the study area.

- **Southern Portion of the Study Area:** The proposed 63-acre lower reservoir would capture precipitation and thus permanently reduce stormwater runoff from the southern portion of the study area. Assuming 10 inches average annual precipitation, this equates to approximately 53 AFY of water captured by the lower reservoir. This amount is a component of the make-up water that would be required for the proposed project's potential losses through evaporation and leakage. The baseline percentages of evapotranspiration, recharge, and runoff were applied to the 53 AFY of precipitation expected to be captured to estimate the groundwater recharge and runoff to streamflow that would be lost to the hydrologic system. Using this methodology, the

lower reservoir is estimated to capture 8 AFY of groundwater recharge and 3 AFY of streamflow (11 AFY total), as shown in Table 4.2-4b. The estimated quantity of water lost to the atmosphere through evapotranspiration (41 AFY) would be the same in the baseline condition and in conditions with the proposed project.

All water supply for the operation of the proposed project—estimated at 360 AFY of make-up water to offset evaporative and leakage losses—would be supplied by KPUD under its existing municipal water right. For reasons discussed under project construction, water supply for proposed project operations would also not result in any new impacts on the hydrology of the Columbia River or other surface waters within the southern study area.

Tables 4.2-4a through 4.2-4c present a water balance analysis to estimate the changes to hydrology—e.g., runoff to surface water and infiltration to groundwater—created by capture of precipitation by each of the proposed reservoirs. Based on that analysis, the estimated 70 AFY of artificial recharge from underground leakage would more than offset the 3 AFY of runoff to streamflow (and the full 11 AFY of recharge plus runoff) that would be lost to the Columbia Tributaries watershed from the upper reservoir's capture of 53 AFY precipitation (Table 4.2-4c). With appropriate control measures and monitoring programs in place, including measurement of the project's operating water balance with quantification of precipitation capture and leakage losses, the capture of precipitation by the upper and lower reservoirs would not result in a significant adverse impact on surface water hydrology.

The Applicant would include hydrologic/groundwater level monitoring as a component of a broader water quality monitoring and response plan, which would be prepared in coordination with Ecology during the permitting process (see Section 4.2.2.3). Should the project's actual operating water balance indicate that the leakage is less than estimated in this analysis, the Applicant will be required to propose alternative mitigation. Mitigation options could include delivering water directly into the impacted watershed to offset the loss (increasing the quantity of make-up water purchased from KPUD) or implementing out-of-kind riparian enhancements in the Swale Creek watershed to satisfy the project mitigation requirements.

Alteration of Groundwater Flow Systems

The estimated leakage from proposed project operation would increase the quantity of groundwater recharge entering the alluvial aquifers that underly the northern and southern portions of the study area. Operational impacts to groundwater flow are summarized as follows:

- **Northern Portion of Study Area:** Based on current information, it appears that the proposed upper reservoir would not extend below the water table. However, if it would, it would be a barrier to groundwater flow and alter existing flow directions by creating some mounding of groundwater along the upgradient (southeast) side of the reservoir. This is unlikely based on the existing groundwater conditions in that area.

  The upper reservoir would capture precipitation (estimated 86 AFY), 14 AFY of which is estimated to infiltrate and recharge the local groundwater system under current conditions (Table 4.2-4b). The estimated 30 AFY of artificial recharge from leakage from the underground infrastructure would more than offset the recharge lost from the upper reservoir footprint.

- **Southern Portion of the Study Area:** Following construction, a portion of the proposed lower reservoir would permanently remain below the existing water table in the UA but would not extend through the UA's full saturated thickness. Where the reservoir extends below the water table, it would be a barrier to groundwater flow, which would likely create some mounding of groundwater along the upgradient (northeast) side of the reservoir. Shallow UA groundwater upgradient of the

reservoir would flow around the reservoir with some flowing eastward and some westward. Those flows would re-establish in the existing southwestward flow direction on the south side of the reservoir. The UA groundwater beneath the reservoir bottom would be expected to generally maintain its existing southwestward flow direction.

The lower reservoir would capture approximately 53 AFY of precipitation, 8 AFY of which is estimated to infiltrate to recharge the UA under current conditions (Table 4.2-4b). Negligible seepage out of the dual-lined lower reservoir is expected, but an estimated 70 AFY of leakage from the underground conveyance system would represent artificial recharge to the basalt aquifer zones within the Columbia Hills bluff that, on the subbasin scale, would more than offset the volume of potential recharge captured by the lower reservoir. It is assumed that the leakage water would flow generally south, but its specific flow path(s) and mechanism(s) for reaching the UA and/or underlying basalt aquifer system are unknown and warrant further analysis as project design proceeds.

The proposed project includes full removal of contaminated materials within the WSI, and construction of the lower reservoir would remove additional contaminant mass present in dissolved phase, which should result in an overall improvement to groundwater quality in the area of the lower reservoir. The WSI removal program under MTCA would involve replacement and repositioning of monitoring wells to accommodate the construction footprint and anticipated changes to groundwater flow direction in order to meet MTCA requirements for post-cleanup confirmation groundwater monitoring. As a result of these combined factors, no significant adverse impacts to groundwater within the former CGA smelter cleanup site are anticipated.

With appropriate control measures and monitoring programs in place—including measurements of the proposed project's operating water balance with quantification of precipitation capture and leakage losses—the alteration to groundwater flow systems resulting from proposed project operations would not result in a significant adverse impact.

The Applicant would include hydrologic/groundwater level monitoring as a component of a broader water quality monitoring and response plan, which would be prepared in coordination with Ecology during the permitting process. Should the project's actual operating water balance indicate that the leakage is less than estimated in this analysis, the Applicant will be required to propose alternative mitigation (see Section 4.2.2.3). Mitigation options could include delivering water directly into the affected subbasin (increasing the quantity of make-up water purchased from KPUD) or implementing out-of-kind riparian enhancements.

Impairment of Water Supplies and Water Rights

No impairment to water supplies or rights was identified in the northern portion of the study area. The estimated leakage from the proposed project's underground infrastructure would offset reductions in groundwater recharge and runoff to streamflow from precipitation captured by the upper reservoir.

The assessment of potential impairment to existing water supplies/water rights for the southern portion of the study area resulting from project operation is discussed for each waterbody, as follows:

- **Columbia River**: Water for the project would be provided by KPUD under an existing municipal water right that, with a priority date of March 19, 1969, pre-dates the Columbia River instream flow rule (WAC 173.563). All project water would by supplied from KPUD's existing pump station just upstream of the proposed project footprint. The proposed project would not result in any new appropriation from the Columbia River or tributaries, and no impairment to Columbia River instream flows is identified.

- **Streams:** Streams, ponds, and seeps in the southern portion of the study area are not covered by an adopted instream flow rule or Biological Opinion but must be considered in the context of impairment to existing water rights and the public interest. Leakage return flow during proposed project operations would increase recharge to shallow groundwater in the immediate project area, which could express itself as increased flow at springs feeding small surface waterbodies. Accordingly, no impairment to water supplies was identified associated with tributary streams, seeps, or water rights in the southern portion of the study area dependent thereon.

- **Groundwater:** No impacts on existing groundwater supplies or water rights are anticipated from proposed project operations. Leakage return flow during operations would increase recharge to, and thus water quantity within, groundwater in the immediate project area. Accordingly, no impairment to water supplies was identified associated with tributary streams, seeps, or water rights dependent thereon.

Therefore, no impacts on water supplies/rights or impairment to existing water supplies or water rights are identified as a result of operation of the proposed project in either the northern or southern portions of the study area.

Stormwater Quality Compliance

It is expected that the proposed project would create few new pollution-generating surfaces for stormwater runoff. Although the actual extent of such surfaces is not available in the current preliminary design documentation, the overall design of the proposed project requires only limited paving and impervious surfaces outside of the proposed reservoirs. Stormwater generated throughout operation of the proposed project would be managed in accordance with an applicable permit issued by Ecology (Industrial Stormwater General Permit or other) with a corresponding Stormwater Pollution Prevention Plan prepared in accordance with Ecology's Stormwater Management Manual for Eastern Washington (Ecology 2019). Therefore, no significant impacts on stormwater quality would occur from operation of the project. As required by permits, the proposed project's stormwater quality must meet water quality benchmarks throughout long-term operation.

Water Quality Compliance in Receiving Waters

Total dissolved solids is a non-specific measure of the total concentration of inorganic salts, principally calcium, magnesium, potassium, sodium, bicarbonates, chlorides, and sulfates, and small amounts of organic matter that are dissolved in water.

During operation of the proposed pumped-storage reservoir system, yearly evaporative cycles would concentrate water quality constituent levels over time (e.g., heat, total dissolved solids, metals, nutrients, and bacteria), despite the annual addition of fresh make-up water from annual precipitation and purchases of water from the Columbia River from KPUD. Neither the Applicant's Environmental Report, Exhibit E of their FERC FLA (FFP 2020a), nor the Preliminary Supporting Design Report (HDR 2020b) include an analysis to predict water quality changes in the system over time. However, the Final EIS for the Swan Lake North Pumped Storage Project (a similar project near Klamath Falls, Oregon) contains a simple predictive analysis to estimate changes in total dissolved solids concentrations in such a system across a 50-year operational period (BLM 2019).

The Swan Lake project analysis assumed a groundwater source of supply containing total dissolved solids concentrations with an average concentration of 95 milligrams per liter. The analysis predicted that total dissolved solids concentrations in the system would double in approximately 8 years of operation and would increase nearly 700%—from 97 to 730 milligrams per liter after 50 years of operation. That Final EIS anticipated similar trends for other water quality constituents, like nutrients and metals, but provided no specific analysis for constituents other than total dissolved solids (BLM 2019).

A similar gradual degradation of water quality is anticipated for the proposed project based on the concentration of water quality constituents from evaporation in the proposed reservoirs over time. This can also include the buildup of bacterial contamination introduced by birds or other wildlife that may contact the water surface in the large reservoirs. An additional water quality concern is the potential for contamination by lubricants, oils, and other materials from the system's large-capacity pump-turbine equipment within the conveyance system. The quantities of these materials are small relative to the quantity of water in the system; however, there is still a potential for them to leak. Depending on where this leakage could occur in the system, these contaminants could become entrained in the water being circulated between the two reservoirs.

The proposed upper and lower reservoirs would be constructed with a synthetic liner system (single-liner system in upper reservoir and double-liner system in lower reservoir) with leak detection capabilities specifically intended to prevent leakage. As such, negligible seepage from the reservoirs is anticipated.

Operational water quality impacts for each portion of the study area are summarized as follows:

- **Northern Portion of Study Area:** The potential for water quality impacts as a result of operations is low. Seepage from the lined upper reservoir is expected to be negligible, and any seepage that may occur would enter shallow groundwater discharging to the ephemeral/intermittent headwater tributaries of Swale Creek. The existing groundwater discharge in that area provides insufficient baseflow to sustain flows in those tributaries, and they are at least 15 river miles upstream of the fish-bearing portion of Swale Creek.

- **Southern Portion of the Study Area:** Although a liner system would also be integrated into the conveyance piping systems connecting the reservoirs, up to 100 AFY of leakage losses from the proposed conveyance system are assumed to occur. Those losses would occur primarily within the Columbia Hills basalt bluff between the two reservoirs (southern portion of study area), and that groundwater return flow would migrate southward with ultimate discharge to the Columbia River. The migration of the assumed leakage return flow is expected to occur via groundwater, although the specific pathway(s) for that migration is not currently defined. Given an expected gradual degradation in water quality within the pumped storage system, this leakage return flow has the potential to impact groundwater quality in the southern portion of the study area as well as the Columbia River, which receives groundwater discharges from that area.

  Potential water quality impacts on the Columbia River associated with KPUD's supply of Columbia River water for the proposed project were addressed during Ecology's permitting of the water right (1969 priority date). No additional water quality impacts associated with KPUD exercising the diversion authorized under that right are expected.

Operation of the proposed project would not result in significant adverse impacts on water quality in receiving waters. Impacts that could occur would be further reduced and minimized by the implementation of appropriate control measures and water quality monitoring programs. Given the concern for water quality degradation within the pumped storage system, the Applicant has proposed mitigation measures, including shade balls on the reservoir water surface and vegetation management to reduce wildlife attraction to the reservoirs (see Section 4.2.2.3). The Applicant has also proposed to prepare and implement a reservoir water quality monitoring plan to ensure that dissolved solids, nutrients, and heavy metals in the reservoirs do not rise to concentrations that could adversely affect aquatic life or wildlife (FFP 2020a).

4.2.2.3 Proposed Mitigation Measures

Permit-Required Mitigation Measures

Compensatory mitigation for impacts on wetlands and regulated waters would be addressed through USACE's Clean Water Act Section 404 Permit process and Ecology's Section 401 Water Quality Certification process for federally jurisdictional wetlands and streams or through Ecology's Administrative Order process under RCW 90.48 of the Washington Water Pollution Control Law for non-federally regulated wetlands and streams. WDFW's Hydraulic Project Approval process would include conditions intended to minimize impacts to instream and riparian habitat and functions for the intermittent streams. Mitigation for any buffer impacts would be determined by Klickitat County.

The required permits, including the 401 Water Quality Certification and NPDES Construction Stormwater General Permit, would require the Applicant to develop, implement, monitor, and maintain a number of construction BMPs to comply with water quality standards and other permit requirements. Expected Construction Stormwater General Permit–required mitigation measures related to water quality during construction include the following:

- Implementation of a construction Stormwater Pollution Prevention Plan in accordance with Ecology's Stormwater Management Manual for Eastern Washington (Ecology 2019)
- Implementation of a Temporary Erosion and Sediment Control Plan to limit sediment inputs to receiving waters during and after construction, which would include revegetating temporary disturbance areas after construction to stabilize soils
- Implementation of a Spill Prevention, Control, and Countermeasures Plan to limit the potential for spills of fuels or other hazardous materials and to facilitate containment in the event a spill occurs, to minimize the potential for pollutant releases to groundwater or surface waters
- Management of stormwater and construction dewatering water in a way that allows it to infiltrate on site and/or ensure it is contained and treated to meet applicable permit water quality benchmarks and indicator levels prior to discharge to surface waters
- Implementation of permit-required monitoring during construction to ensure that all discharges to waters of the state comply with water quality benchmarks, that erosion, sediment, and pollution-control measures are regularly inspected and maintained, and that records are kept and submitted to Ecology as appropriate

In addition to standard requirements of the Construction Stormwater General Permit, the site-specific Administrative Order would establish indicator levels for known contaminants of concern at the cleanup site, and require capture and treatment of all contaminated dewatering water or contaminated stormwater generated prior to discharge. It would also require rigorous monitoring and reporting of the monitoring data to Ecology to ensure that all water discharged to receiving waters complies with the indicator levels.

The planned on-site production of concrete would trigger an NPDES Sand and Gravel Permit issued by Ecology, which would require implementation of BMPs and targeted monitoring to control pH and other pollutants from process water and stormwater.

The following mitigation measures for wetlands and regulated waters would likely be required through the permitting processes:

- **Compensatory Wetland and Stream Mitigation.** To mitigate for permanent excavation and/or placement of fill in wetlands and streams during construction of the proposed project, compensatory mitigation would be provided by the Applicant at agency-approved mitigation ratios through the federal, state, and local permitting processes.

- **Restoration of Disturbed Wetlands and Streams.** For wetlands and streams that are temporarily disturbed during construction of the proposed project, the Applicant would be required to restore the resource to pre-construction conditions through the federal, state, and local permitting processes.
- **Compensatory Buffer Mitigation**. To mitigate for permanent removal of wetland and stream buffers during construction of the proposed project, compensatory mitigation would be provided by the Applicant as determined by County laws and ordinances.
- **Restoration of Disturbed Buffers.** For wetland and stream buffers that are temporarily disturbed during construction of the proposed project, the Applicant would be required to restore buffers as determined by local laws and ordinances.

Applicant-Proposed Mitigation Measures

In addition to the permit-required measures, the following Applicant-proposed water resources mitigation measures are intended to further reduce potential effects from construction and operation of the proposed project. These mitigation measures would be included as articles of the FERC license and would be enforced with other license requirements. The Applicant has proposed preparation of a mitigation plan, to be submitted to and approved by USACE and Ecology as a component of the Clean Water Act Section 404/401 permitting process. Their overall goal is to provide the greatest improvement to ecological and hydrological functions in the broader Klickitat River subbasin, within which Swale Creek is a tributary. To reduce temporary construction impacts, the Applicant proposes to design the staging areas and employ construction BMPs throughout the work to minimize impacts on Stream S8, Wetland A, and Wetland B and facilitate their restoration to the extent practical following completion of construction.

Applicant-proposed mitigation measures include the following:

- **Shade Balls in Reservoirs.** As part of their proposed Wildlife Management Plan (WMP; FFP 2020c), the Applicant proposes to use floating shade balls in each reservoir. In addition to wildlife deterrence, shade balls could mitigate water quality impacts from long-term operation of the proposed project. The use of shade balls would help reduce heating and evaporation of water in the reservoirs, reducing potential impacts on both water temperature and water loss. In combination with vegetation management both in and around the reservoirs, shade balls may also deter birds and other wildlife (e.g., bats) from contacting the water to reduce entry of bacterial contamination to the water. These measures, and their adaptive management over time, would be included as a component of the Operations Water Resource Monitoring and Response Plan (see the Ecology-proposed mitigation measure below).

- **Reservoir Water Quality Monitoring Plan.** The Applicant would develop a water quality monitoring plan in coordination with Ecology to ensure that dissolved solids, nutrients, and heavy metals in the reservoirs do not rise to concentrations that could adversely affect aquatic life or wildlife (FFP 2020a). The water quality monitoring plan would identify monitoring locations and procedures for water quality parameter monitoring within the proposed system and in the nearby vicinity to identify whether water quality conditions warrant additional protective measures. The water quality monitoring plan would include the specifics of any additional protective measures proposed, which could include modifying the system operation to incorporate active water treatment. The water quality monitoring plan could be expanded to be inclusive of all operational water resource-related monitoring (e.g., surface and groundwater level monitoring, wetland hydrology monitoring) and could be enforced under the Section 401 Water Quality Certification.

Ecology-Proposed Mitigation Measures

Ecology-proposed water resources mitigation measures that would be included as conditions in the reservoir permit include the following:

- **Construction Water Resource Monitoring and Response Plan.** To mitigate hydrologic and water quality impacts from construction of the proposed project, the Applicant would prepare a Construction Water Resource Monitoring and Response Plan to be approved by Ecology and then implemented throughout construction of the proposed project. The Construction Water Resource Monitoring and Response Plan would establish an integrated program to monitor both water quantity (hydrology) and water quality for groundwater, surface water, and wetlands and thereby empirically measure the presence and magnitude of adverse impacts during construction, with a focus on dewatering. The Construction Water Resource Monitoring and Response Plan would also define metrics for determining the presence and degree of impact (e.g., change from baseline conditions), and include a decision process for identifying the need for, and type of, response action to implement during construction to mitigate impacts that are observed on water quantity or quality.
- **Operations Water Resource Monitoring and Response Plan.** To mitigate hydrologic and water quality impacts from long-term operation of the proposed project, the Applicant would prepare an Operations Water Resource Monitoring and Response Plan to be approved by Ecology and then implemented throughout operation of the proposed project. The Operations Water Resource Monitoring and Response Plan would establish an integrated program to monitor both water quantity (hydrology) and water quality for groundwater, surface water, and wetlands. This would allow empirical measurement for the presence and magnitude of adverse impacts during operation. The focus of the Operations Water Resource Monitoring and Response Plan would be documenting the quantity and quality of seepage or leakage from the system and any associated impacts on receiving waters and wetlands. The Operations Water Resource Monitoring and Response Plan would also define metrics for determining the presence and degree of impact (e.g., change from baseline conditions), and include a decision process for identifying the need for, and type of, response action to adaptively implement during proposed project operations to mitigate impacts that are observed on water quantity or quality.

Relevant Mitigation Measures in Other Sections

In addition to the permit-required, Applicant-proposed, and Ecology-proposed measures, implementation of mitigation proposed in other sections of this EIS would also further reduce potential effects of the proposed project and protect water resources.

The following is a brief summary of an Applicant-proposed mitigation measure to reduce impacts on terrestrial species and habitats; a summary of the VMPP is provided in Section 4.7.2.3 and the *Terrestrial Species and Habitats Resource Analysis Report* (Appendix G; Anchor QEA 2022c):

- **The Applicant's Draft Vegetation Management and Monitoring Plan.** The Applicant proposed several mitigation measures to reduce impacts on terrestrial habitat and species in their draft VMMP (FFP 2020e) (see Section 4.7). Measures in the VMMP that would also protect water quality include maintenance in the areas surrounding each reservoir to eliminate vegetation and other features that could otherwise serve as an attraction to wildlife that could degrade water quality.

4.2.2.4 Significant and Unavoidable Adverse Impacts

The analysis found the proposed project would have no significant adverse impacts related to water resources. Compensatory mitigation for impacts on wetlands and regulated waters would be addressed through USACE's Clean Water Act Section 404 Permit process and Ecology's Section 401 Water Quality Certification process for federally jurisdictional wetlands and streams or through Ecology's Administrative Order process under RCW 90.48 of the Washington Water Pollution Control Law for non-federally regulated wetlands and streams. Additional measures may be required as part of permitting, and permit-required, Applicant-proposed, and Ecology-proposed mitigation measures are described in Section 4.2.2.3 to further reduce potential impacts. There would be no significant and unavoidable adverse impacts related to water resources from construction or operation of the proposed project.

4.2.3 Findings for the No Action Alternative

Under the No Action Alternative, the proposed project facilities would not be constructed. Investigation of contamination and development of cleanup actions for the CGA smelter site would continue through a separate MTCA cleanup process. KPUD would continue to hold the existing Cliffs water right, which may provide water supply to other customers or be placed in trust. Under the No Action Alternative, there would be no changes to the existing quantity and quality of groundwater and surface water within the study area.

In the absence of the proposed project fully removing the WSI, it is unknown what cleanup action would be required for the WSI through the full site cleanup process, which is underway. Under the MTCA process, a feasibility study would evaluate alternatives to address the contaminant impacts associated with all areas of the site including groundwater impacts associated with the WSI. For purposes of evaluating the No Action Alternative, it is assumed that the MTCA disproportionate cost analysis conducted as part of the feasibility study would conclude that the incremental cost to fully remove the WSI would be greater than the incremental environmental benefit achieved relative to the continued containment, inspection, and monitoring of the WSI. Therefore, under the No Action Alternative, it is assumed that the WSI would remain intact and continue to be monitored and maintained under the existing closure plan. However, the WSI would remain within the ongoing MTCA cleanup process for the smelter site and could be subject to additional remedial actions potentially requiring long-term stewardship measures, monitoring, and land-use restrictions that would be expected to be part of the cleanup plan.

A cleanup action could involve impacts on surface waters, wetlands, and buffers including potential losses in the amount of area of those resources and loss of wetland and stream functions and values from cleanup actions. A cleanup action could involve restoration and may provide benefits to wetlands, regulated waters, and buffers in the study area. Any cleanup action that would require excavation or placement of fill material into a wetland or water would follow the required Clean Water Act Section 404 permit process, which would include mitigation requirements. Other state and local permits would also be required, which would also require mitigation for unavoidable impacts.

Overall, impacts on wetlands, regulated waters, and buffers under the No Action Alternative are expected to be minor. Through compliance with laws and with implementation of appropriately determined mitigation measures, there would be no significant adverse impacts related to wetlands, regulated waters, and buffers from the No Action Alternative.

4.3 Air Quality and Greenhouse Gases

Air quality refers to the condition of the breathable air and the presence of pollutants. Pollutants can be local and affect a small area, or regional, such as ozone. These pollutants are regulated under state and federal laws. Gases that trap heat in the atmosphere are referred to as greenhouse gases (GHGs) because they capture heat radiated from the sun as it is reflected back into the atmosphere from the Earth, like a greenhouse does. The accumulation of GHGs contributes to global climate change, which affects people and the environment.

The *Air Quality and Greenhouse Gases Resource Analysis Report* (Trinity 2022a), in Appendix D, has the full analysis and technical details used to evaluate air quality and GHGs in this EIS. This section summarizes how impacts were evaluated and presents the main findings of the analysis. Potential effects related to climate change from increasing GHGs are described in Chapter 5, Climate Change, including effects of the proposed project contributing to climate change and effects of climate change on the proposed project.

The study area for evaluating air quality and GHG emissions includes the project footprint, areas traveled by construction vehicles and equipment within the project area, and immediately surrounding areas where odors may be perceptible or health risks could result from emissions.

Key Findings of the Air Quality and Greenhouse Gas Analysis

The analysis found the proposed project would have **no significant and unavoidable adverse impacts** related to air quality and GHG emissions.

Estimated total GHG emissions associated with construction would be approximately 87,919 metric tons of CO_2e (17,584 metric tons annually for 5 years). Estimated total GHG emissions associated with operation of the proposed project would be approximately 80,708 metric tons of CO_2e (1,614 metric tons annually for 50 years).

Emissions of some criteria pollutants, GHGs, and hazardous/toxic air pollutants would likely reach levels at which Washington State permits, approvals, and annual reporting may be required. Emissions would be below federal limits.

Mitigation is not required to reduce any significant impacts, but strategies are proposed to further reduce potential emissions. Additional measures may be required as part of state air quality permitting.

Air Quality

Regional air quality is affected by the combination of all atmospheric emission sources and can vary dramatically over geography and time. The primary emission sources from human activity in the study area include vehicle combustion, regional home and building heating, electrical generation, and industrial operations. The primary drivers of these emissions are fossil fuel combustion and particulates that are generated from both combustion and material disturbance. Criteria pollutants include particulate matter (PM), oxides of nitrogen, sulfur dioxide, carbon monoxide, and ozone. Emissions are also possible for volatile organic compounds and hazardous or toxic air pollutants.

The study area is located within an area designated Attainment or Unclassifiable for all criteria pollutants. This designation means that the area met federal air quality standards in the most recent designation, and USEPA and Ecology expect the area to continue to meet air quality standards. More detailed information on regional air quality monitoring and information on specific criterial pollutants is available in Appendix D.

Greenhouse Gases

In additional to criteria pollutants, USEPA and Ecology review a category of pollutants that have the capacity to increase heating within the Earth's atmosphere. These pollutants—such as carbon dioxide, methane, nitrous oxide, sulfur hexafluoride, perfluorocarbons, and hydrofluorocarbons—are commonly referred to as GHGs and can accumulate in the atmosphere and contribute to global climate change.

The primary sources of GHGs from human activity include the combustion of fossil fuels, including for transportation, heating, and electricity generation. Additionally, coal mining, oil and gas development and venting, and some agricultural practices release methane. Other smaller quantities of rarer GHGs such as perfluorocarbons, hydrofluorocarbons, and sulfur hexafluoride are released by industrial and chemical processes. While the quantity of emissions is often small, the high global warming potential of these chemicals can result in significant effects. Changes to global land cover and vegetation can also influence the carbon lifecycle of GHGs.

Global warming potentials indicate the relative impact of each chemical compared to the same amount of carbon dioxide.

For example, methane is 28 times as potent as carbon dioxide at trapping heat, and sulfur hexafluoride is 25,200 times more potent than carbon dioxide on a 100-year time scale (IPCC 2021).

Global warming potentials vary based on the time interval due to chemical decay of GHGs in the atmosphere. Global warming potentials are typically reported on a 20-, 100-, and 500-year time horizon.

The analysis for this EIS references 100-year global warming potentials because this time horizon is most closely aligned with the time interval evaluated for the proposed project.

The emission rate of each GHG pollutant type is multiplied by the global warming potential of the gas to compute the total carbon dioxide equivalent (CO_2e) emission rate, which forms the foundation of a GHG analysis. In 2018, Washington produced about 99.57 million gross metric tons of CO_2e from the following sources (Ecology 2021c):

- 44.9% from transportation
- 23.4% from residential, commercial, and industrial heating
- 16.3% from electricity consumption (both in-state and out-of-state)
- 15.4% from agriculture, waste management, natural gas distribution, and industrial processes

Hazardous and Toxic Air Pollutants

Hazardous and toxic air pollutants are collective terms for hundreds of chemical pollutants that are known to cause cancer or other serious or fatal health effects. Ambient concentration levels for hazardous air pollutants are not routinely monitored; however, special studies are often assessed for individual types of hazardous air pollutants, particularly in urban or industrialized environments. Given the low population and industrial development in the study area, elevated hazardous air pollutant concentrations would not be expected to exist in the study area. Additionally, the nearest potential sensitive receptors for hazardous and toxic air pollutants, which are typically schools and residences, are greater than 5,000 feet from the study area.

4.3.1 How Impacts Were Analyzed

The analysis looked at how construction and operation of the proposed project could affect air quality and contribute to GHG emissions. Construction phase air pollutants and GHGs were calculated for activities across the entire time period of construction for on-site and off-site sources, including expected emissions from haul trucks and other vehicles, construction equipment, generators, blasting, concrete production, and fugitive dust generation. Operational phase emissions were evaluated for sources within

the proposed project boundary based on the Applicant's planned regular operating scenarios. Emission factors for construction and operation were determined from information in the Applicant's project description and using AP-42 (USEPA 1995), CFR 40.98, or manufacturer supplied information. Attachment 1 of Appendix D includes emissions inventory calculations.

The emission rate of criteria pollutants and hazardous and toxic air pollutants forms the foundation of the air quality analysis to determine the magnitude of potential impacts. Projected emissions from each phase of the proposed project were compared to state and federal laws, policies, guidance, and permitting thresholds for context and to evaluate impacts. GHG emissions were compared to state regulatory programs and GHG reduction goals to determine alignment.

4.3.2 Findings for the Proposed Project

4.3.2.1 Impacts from Construction

Air Quality

The two on-site concrete batch plants would be sources of particulate emissions during 3 of the 5 years of construction. Fugitive dust emissions from drilling, blasting, excavation/fill, material hauling, and general construction support activities would occur throughout the construction period. Air quality impacts would also result from construction-related fuel combustion in haul trucks, construction equipment, and generators and small equipment. Blasting emissions would arise from the combustion of ammonium nitrate and fuel oil.

Particulate Matter Emissions

PM_{10} refers to particulate matter with a diameter of less than 10 micrometers.

$PM_{2.5}$ refers to particulate matter with a diameter of less than 2.5 micrometers.

Emissions inventory calculations are available in Attachment 1 of Appendix D. Findings for criteria pollutants and GHG emissions are summarized and compared to relevant thresholds in Table 4.3-1. The emission rates in Table 4.3-1 are depicted as average tons per year across the 5-year construction phase. Table 4.3-1 shows that the estimated criteria pollutant emissions for construction would be above the threshold for an Ecology NOC permit application for construction phase emissions. As a result, the construction phase may require an NOC permit or general order of approval. Table 4.3-1 also shows the criteria pollutant average annual emission rates would be well below the significance thresholds for the Prevention of Significant Deterioration regulations (CFR 40.52.21) and the Federal Operating Permit Requirements, also known as Title V (CFR 40.70). Therefore, construction phase criteria pollutant impacts would not result in significant adverse impacts.

Table 4.3-1

Construction Phase Total Emissions: Average Tons Per Year Over 5 Year Construction Period, Direct Impacts

POLLUTANT	CONSTRUCTION TOTAL	TOTAL STATIONARY AND NOC APPLICABLE CONSTRUCTION EMISSIONS[1]	NOC THRESHOLD	COMPARISON TO NOC THRESHOLD	TITLE V PERMIT THRESHOLD[2]	PSD MAJOR SOURCE THRESHOLD[3]	COMPARISON TO PSD AND TITLE V THRESHOLDS[4]
PM_{10}	1,086.20	4.39	0.75	Above	100	250	Below
$PM_{2.5}$	118.17	4.39	0.50	Above	100	250	Below
Oxides of nitrogen	216.92	89.79	2.0	Above	100	250	Below
Carbon monoxide	176.72	20.58	5.0	Above	100	250	Below
Sulfur dioxide	1.56	0.00	2.0	Below	100	250	Below
Volatile organic compounds	11.81	2.64	2.0	Above	100	250	Below
Carbon dioxide	19,318.09	NA	NA	NA	NA	NA	NA
Methane	0.78	NA	NA	NA	NA	NA	NA
Nitrous oxide	0.16	NA	NA	NA	NA	NA	NA
CO_2e [5, 6]	19,382.74 (17,584 metric tons)	NA	NA	NA	NA	NA	NA

Notes:

1. Stationary emissions include non-fugitive and stationary construction emissions, which are limited to the concrete batch plant and generators.
2. Title V operating permit thresholds codified in CFR 40.40.
3. PSD major source thresholds codified in CFR 40.51.
4. Comparison to both thresholds does not include fugitive emissions or mobile source emissions.
5. CO_2e calculated based on Global Warming Potentials in Table A-1 IPCC AR6 Table 7.SM.7 for 100-year time horizon.
6. GHG emissions related to off-site production of cement are considered indirect emissions and are not included in this table. Those emissions are discussed separately in the Indirect Construction Impacts section, and quantified to be approximately 59,642 tons of CO_2e total.

grey shading indicates reference threshold values

NA: not applicable

NOC: Ecology Notice of Construction

PSD: Prevention of Significant Deterioration

Greenhouse Gases

The project construction phase would produce GHG emissions from fuel combustion and would result in approximately 87,919 metric tons of CO_2e over the 5 years of proposed construction, or approximately 17,584 metric tons of CO_2e annually. Because construction is estimated to produce greater than 10,000 metric tons of CO_2e annually, reporting of GHG emissions would likely be required under the provisions within RCW 70A.15.2200. However, annual construction GHG emissions are expected to be below the 25,000 metric tons of CO_2e annual level that would require the facility to enter the cap-and-invest program under the Washington Climate Commitment Act.

Hazardous and Toxic Air Pollutants

The primary sources of hazardous and toxic air pollutants during construction would be mobile and stationary internal combustion engines. Priority mobile source air toxics generated during construction would include acrolein, benzene, formaldehyde, diesel PM/diesel exhaust organic gases, naphthalene, polycyclic organic matter, and 1,3-butadiene. As shown in Table 4.3-1, the estimated criteria pollutant emissions would be above the threshold for an Ecology NOC permit application and construction may require an NOC permit or general order of approval. Toxic air emissions would likely have a minor effect on air quality based on comparison to other similar projects and would be further evaluated using air dispersion modeling if required as part of an Ecology NOC permit application for construction emissions, which could lead to curtailment of toxic air pollutant emissions. Additionally, mitigation measures proposed in Appendix D and summarized in Section 4.3.2.3 could further reduce the potential emissions of air toxics.

Indirect Construction Impacts

Emissions from material haul trucks and construction employee vehicles were accounted for in the impact calculations summarized above, but uncertainties in vehicle travel distances outside the project boundary prevent an accurate analysis of additional indirect emission impacts from these sources. Off-site emissions from vehicle travel are considered an indirect impact of the project construction phase; however, they would not result in significant impacts.

GHG emissions at off-site cement plants are also considered as indirect impacts of the project in Appendix D. The production of cement in calcination kilns makes up a large portion of lifecycle air emissions arising from concrete structure construction. Off-site cement plants are regulated as entities separate from the proposed project, but anticipated CO_2e emissions from cement production specific to the project were calculated based on the total anticipated concrete needs. This resulted in an estimated total of 59,642 tons of CO_2e emissions for off-site cement production for the proposed project. These emissions are considered indirect impacts and cement plants may be subject to air emission standards that may also require mitigation separate from those considered for the proposed project.

4.3.2.2 Impacts from Operation

Air Quality

During proposed project operations, the emissions-generating sources would be limited to emergency generator operation, portable generator operation, and vehicle traffic. Emissions inventory calculations are available in Attachment 1 of Appendix D. Findings for criteria pollutants and GHG emissions are summarized and compared to relevant thresholds in Table 4.3-2. The emission rates in Table 4.3-2 are depicted as average tons per year. Table 4.3-2 shows that the estimated criteria pollutant emissions for proposed project operations would be above the threshold for an Ecology NOC permit application for oxides of nitrogen, carbon monoxide, and $PM_{2.5}$, thus requiring an NOC permit. Table 4.3-2 also shows the criteria pollutant average annual emission rates would be below the significance thresholds for the Prevention of Significant Deterioration regulations (CFR 40.52.21) and the Title V program (CFR 40.70). Therefore, operational phase criteria pollutant impacts would not result in significant adverse impacts.

Table 4.3-2

Operation Phase Total Emissions: Average Tons Per Year, Direct Impacts

POLLUTANT	OPERATIONAL TOTAL	TOTAL STATIONARY AND NOC APPLICABLE OPERATIONAL EMISSIONS[1]	NOC THRESHOLD	COMPARISON TO NOC THRESHOLD	TITLE V PERMIT THRESHOLD[2]	PSD MAJOR SOURCE THRESHOLD[3]	COMPARISON TO PSD AND TITLE V THRESHOLDS[4]
PM_{10}	1.07	0.70	0.75	Below	100	250	Below
$PM_{2.5}$	1.07	0.70	0.50	Above	100	250	Below
Oxides of nitrogen	36.69	24.14	2.0	Above	100	250	Below
Carbon monoxide	8.41	5.53	5.0	Above	100	250	Below
Sulfur dioxide	1.86E-06	1.22E-06	2.0	Below	100	250	Below
Volatile organic compounds	1.08	0.71	2.0	Below	100	250	Below
Carbon dioxide	1,773.37	NA	NA	NA	NA	NA	NA
Methane	7.19E-02	NA	NA	NA	NA	NA	NA
Nitrous oxide	1.44E-02	NA	NA	NA	NA	NA	NA
CO_2e [5]	1,779.30 (1,614 metric tons)	NA	NA	NA	NA	NA	NA

Notes:

1. Per WAC 173.400.110(4)(c)(iv) the 150-kilowatt non-emergency generator is exempt from NOC requirements. The two 1,500-kilowatt emergency generators are above exemptible power rating in WAC 173.400.110(4)(h)(xxxix). Stationary emissions include the two emergency engine-generator sets. The portable 150-kilowatt generator is not stationary.
2. Title V operating permit thresholds codified in CFR 40.40.
3. PSD major source thresholds codified in CFR 40.51.
4. Comparison to both thresholds does not include fugitive emissions or mobile source emissions.
5. CO_2e calculated based on Global Warming Potentials in Table A-1 IPCC AR6 Table 7.SM.7 for 100-year time horizon.

grey shading indicates reference threshold values

NA: not applicable

NOC: Ecology Notice of Construction

PSD: Prevention of Significant Deterioration

Greenhouse Gases

Operation of the proposed project would produce a small amount of GHG emissions, approximately 1,614 metric tons of CO_2e annually, from generator use and limited worker and service vehicle trips. This level is below Washington Climate Commitment Act applicability thresholds. The proposed project is expected to result in approximately 80,708 metric tons of CO_2e over the 50-year operational time frame. GHG emissions could potentially be further reduced through the use of mitigation measures proposed in Appendix D and summarized in Section 4.3.2.3, which may further enhance alignment of the operation phase GHG impacts with state GHG reduction goals in RCW 70A.45.

Hazardous and Toxic Air Pollutants

The primary sources of hazardous and toxic air pollutants for the operational phase would be diesel internal combustion engines in generators and worker/service vehicle trips. As shown in Table 4.3-2, the estimated criteria pollutant emissions for the operations phase may require an Ecology NOC permit. Toxic air emissions would likely have a minor effect on the air quality resource based on comparison to other similar projects and would be further evaluated using air dispersion modeling if required as part of an Ecology NOC permit application, which could lead to curtailment of toxic air pollutant emissions. Additionally, mitigation measures proposed in Appendix D and summarized in Section 4.3.2.3 could further reduce the potential emissions of air toxics.

Indirect Operational Impacts

Off-site emissions from employee and service vehicle travel are considered an indirect impact of the operational phase of the proposed project. Similar to the construction phase, there is a large degree of uncertainty in the actual travel distances that prohibits an accurate analysis of these indirect impacts; however, they would not result in significant adverse impacts.

4.3.2.3 Proposed Mitigation Measures

No mitigation measures would be required because there would be no significant adverse impacts. Although not required to reduce any significant impacts, Ecology is proposing mitigation strategies to further reduce potential effects on air quality and GHG emissions from construction and operation of the proposed project. Some of these mitigation measures may also be required as part of air quality permitting. Mitigation would be considered by regulatory agencies during permitting for the proposed project and may be included as a condition or requirement of the permits and approvals.

Permit-Required Mitigation Measures

A complete air permit applicability analysis would be based on maximum potential emissions, which may be greater than the estimates in this EIS. A complete air permit applicability analysis would be completed at a later date and would contain definitive determinations of required air permits and associated conditions. Permits with conditions related to air quality and GHG emissions are expected to include the facility-wide NOC permit or general order of approval for construction emissions and an air permit for operation phase generator and portable equipment emissions. Additional permits may be required based on the specific development timeline and design at the time of construction and operation.

Ecology-Proposed Mitigation Measures

The following are brief summaries of the Ecology-proposed air quality and GHG mitigation measures; Section 3.3.4 of Appendix D contains more complete descriptions of these measures:

- **Use of Best Management Practices During Construction.** Strategies that could be used to reduce fugitive dust are detailed in Appendix D, including spraying soil with water, minimizing idling of equipment, covering material piles, sweeping, installation of dust collectors, applying dust suppressant, or timing construction to avoid high winds.

- **Selection of Efficient Equipment.** Strategies for preferential selection of electric powered, hybrid-electric powered, high fuel efficiency, and/or low carbon fuel powered construction equipment, haul trucks, generators, and employee commuting vehicles as practicable are detailed in Appendix D.

4.3.2.4 Significant and Unavoidable Adverse Impacts

The analysis found the proposed project would have no significant adverse impacts related to air quality and GHG emissions. Mitigation is proposed to facilitate further reduction of potential emissions. Additional measures may be required as part of state air quality permitting. There would be no significant and unavoidable adverse impacts related to air quality and no significant increase in GHG emissions from construction or operation of the proposed project.

4.3.3 Findings for the No Action Alternative

Under the No Action Alternative, the proposed project facilities would not be constructed. Investigation of contamination and development of cleanup actions for the CGA smelter site would continue through a separate MTCA cleanup process. In the absence of the proposed project fully removing the WSI, it is unknown what cleanup action would be required for the WSI through the full site cleanup process, which is underway. For purposes of evaluating the No Action Alternative, it is assumed that the WSI would remain intact and continue to be monitored and maintained under the existing closure plan. However, the WSI would remain within the ongoing MTCA cleanup process for the smelter site and could be subject to additional remedial actions potentially requiring long-term stewardship measures, monitoring, and land-use restrictions that would be expected to be part of the cleanup plan. This could result in a minor increase in emissions of criteria pollutants, hazardous and toxic air pollutants, and GHGs; however, the magnitude of emissions under the No Action Alternative is not precisely estimated due to uncertainties in the extent of cleanup work that would be required. No significant adverse impacts with respect to air quality and GHGs would be expected from the No Action Alternative.

4.4 Energy Resources

The type and quantity of energy resources used in construction and operation of a project can affect overall availability of energy sources for other uses. Conservation features and energy efficiency of a project can reduce the impacts associated with energy consumption. This section describes sources and availability of energy resources, the amount of energy that would be required by the proposed project, and the rate and efficiency of proposed energy use.

The *Energy Resource Analysis Report* (Trinity 2022b), in Appendix E, has the full description of existing conditions in the affected environment, as well as the full analysis and technical details used to evaluate energy sources and energy use. This section summarizes how impacts were evaluated and summarizes the findings of that report.

Key Findings of the Energy Analysis

The analysis found the proposed project would have **no significant and unavoidable adverse impacts** related to energy resources.

Local energy resources would not be constrained by construction and operation of the proposed project. Energy use would be consistent with local and regional energy plans and would not impact adjacent uses of energy.

The proposed project's pumped-water energy storage system is estimated to have between 70% to 85% net efficiency.

Mitigation is not required to reduce any significant impacts.

The study area for energy resources includes the proposed project area, resources that could be locally affected (including electricity, liquid fuels, and other energy sources), and a broader consideration of electricity resources at the regional level within the Columbia River Basin.

Energy Demand and Availability

Regionally, the Northwest Power and Conservation Council develops and maintains a regional power plan based on the Northwest Power Act, with the goal of balancing the Pacific Northwest's environment and energy needs. Northwest Power and Conservation Council growth estimates and plans are summarized in Appendix E, and show a projected growth in electricity demand of an additional 1,800 to 4,400 average MW from 2015 to 2035 (NWPCC 2016).

In Washington, the state's total electricity generating capacity of approximately 30,600 MW in 2019 came from the following sources (WECC 2019):

- 69.4% from hydroelectric generation
- 20.6% from baseload resources (electricity generation that operates continuously to meet the minimum level of demand), of which roughly 53% were from natural gas combustion, 21% from coal combustion, and 18% from nuclear generation
- 9.8% from wind resources
- Less than 2% from biogas, petroleum, and wood combustion

KPUD is the exclusive provider of retail electric service in Klickitat County and provides electricity service to the proposed project area. KPUD uses several facilities for energy generation including the White Creek Wind Farm, the Roosevelt Biogas 1 facility, the McNary Fishway Hydro Project, and a 230 kV substation and associated transmission lines (KPUD 2021a). More information about these facilities is in Section 3.2.1 of Appendix E. Potential impacts of the proposed project on utility providers, including KPUD, are analyzed in Section 4.5, Public Services and Utilities.

Local Energy Resources

Electricity generated near the proposed project area includes several wind turbine projects and the John Day hydroelectric project. Two major 500 kV electrical transmission lines traverse Klickitat County from southwest to northeast. One enters the county in the southwest corner and exits in central Klickitat County near Highway 97. The second enters the county near John Day Dam and exits in central Klickitat County north of Bickleton. A 345 kV transmission line traverses Klickitat County from east to west along the southern edge of the county. Finally, a 500 kV transmission line traverses the southern edge of the county commencing at John Day Dam and extending east to the southeast corner of the county. A network of smaller transmission lines also traverse Klickitat County; in the immediate vicinity of the proposed project, there are multiple 230 kV and 115 kV transmission lines (WECC 2019).

A single 26-inch high-pressure natural gas transmission pipeline traverses Klickitat County from east to west along the southern edge of the county. The Williams Pipeline Company operates the pipeline and maintains two compressor stations in Klickitat County, near Goldendale and Roosevelt. The pipeline has a peak system design capacity of 3.8 million dekatherms per day (Williams 2021).

Diesel and gasoline fuels are available from licensed distributors in nearby cities or could be transported from regional bulk storage terminals around Pasco, Washington, or Portland, Oregon.

4.4.1 How Impacts Were Analyzed

Estimated construction energy use was calculated based on projections of the magnitude and type of construction activities and assumptions of the energy requirements for each (see Attachment 1 of Appendix E). Operational fuel use was estimated for the on-site engine-generator set (generator). Because no energy storage system is 100% efficient, the net efficiency of the pumped storage system was also calculated. The actual energy stored and generated by the proposed project would have large fluctuations based on weather and seasonal climate variability, and hour-by-hour regional electricity demand and dispatch from other energy generating sources. The evaluation used net efficiency instead of total system energy usage, due to the fluctuation of energy storage and generation and the overall purpose of the proposed project to offset fossil fuel electricity generation and enhance stability for renewable energy generation.

Net Efficiency: The ratio of recoverable energy generated by the proposed project, as compared to the energy requirements to pump water to the upper reservoir.

Factors considered for the analysis of impacts related to energy included the following:

- The amount of energy to be used through fuel and electricity used in construction and operations
- The net efficiency of energy use in operations
- Consistency with local and regional energy plans
- Potential impacts from construction or operations on adjacent uses of energy sources

4.4.2 Findings for the Proposed Project

4.4.2.1 Impacts from Construction

Direct Impacts

Energy use during construction would consist of fuel combustion to operate material haul trucks, non-road mobile vehicles, a single large generator for tunneling operations, various portable small equipment such as lights and lifts, and employee vehicle travel. The on-site concrete batch plants and aggregate crushing and screening operations would be powered by connection to the electrical grid. The analysis in

Appendix E determined the proposed project would require a total estimated 9,309,822 gallons of diesel and 1,342,250 gallons of gasoline over the 5-year construction period (Trinity 2022b). Detailed calculations are included in Attachment 1 of Appendix E, and discussion of the assumptions and any uncertainties related to the calculations are detailed in Section 3 of Appendix E.

The amount of fuel anticipated to be consumed during construction of the proposed project would not be expected to adversely affect locally available resources of liquid fuel energy. Therefore, there would be no significant adverse impacts with respect to energy usage during construction.

Indirect Impacts

Construction of the proposed project would be adjacent to existing wind turbines owned by the Turlock Irrigation District. Construction equipment and structures that are planned to be built for the proposed project would not have prominence above the ground at a height tall enough to affect the generating potential of the adjacent wind turbines. Therefore, there would be no significant adverse impacts with respect to adjacent energy uses during construction.

4.4.2.2 Impacts from Operation

Direct Impacts

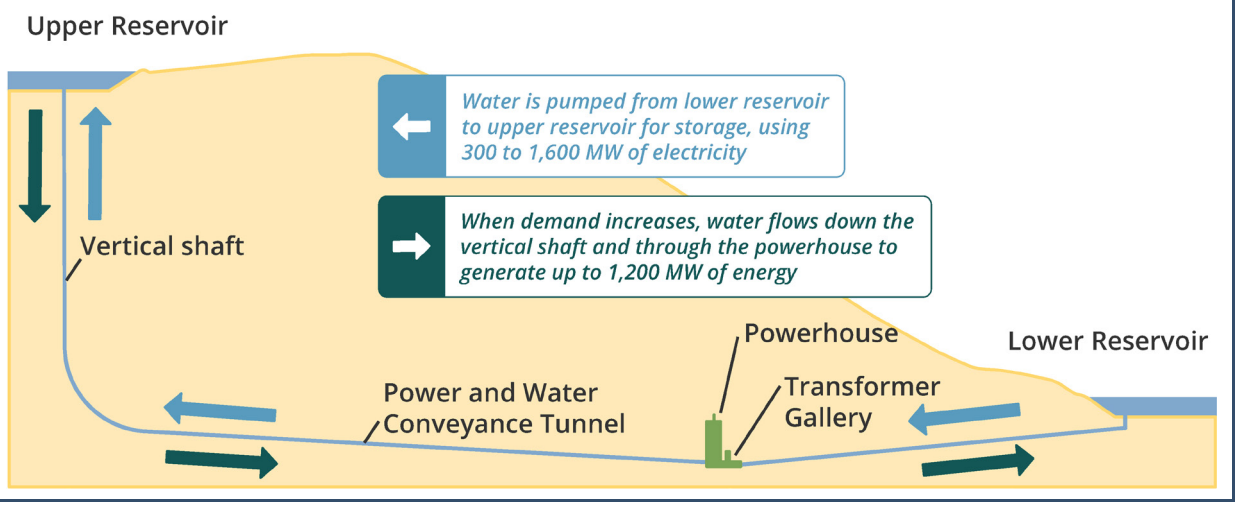
Energy use during operation of the proposed project would consist of electricity to pump water to the upper reservoir and for operational support activities, and diesel fuel used in generators for maintenance and emergencies.

The analysis in Appendix E determined the proposed project would require a total estimated 31,460 gallons of diesel fuel per year (Trinity 2021b). Detailed calculations and assumptions are included in Appendix E. This amount of anticipated annual fuel consumption during operation of the proposed project would not be expected to adversely affect locally available resources of liquid fuel energy.

The electricity used to pump water to the upper reservoir would be used by the three 400-MW pump-turbine units that have an overall cycle efficiency of approximately 80% (FFP 2020a). Depending on how many pump-turbine units are in operation, approximately 300 MW to nearly 1,600 MW of electricity would be required to pump water up to the upper reservoir. The proposed project would also consume utility grid electricity during the operation phase for support activities such as lighting, computers, and maintenance tools. The average energy usage for support activities is estimated to be 39,000 MW-hours, plus or minus 25% annually (Trinity 2021b).

The Applicant proposes to purchase electrical power from grid sources during periods of low demand to pump water to the upper reservoir. During peak demand house, they would provide gravitational hydroelectric energy generation to sell electricity back to the grid as required for energy supply stability (Figure 4.4-1). The Applicant's intent is to draw power during times of high-volume generation from renewable sources such as wind and solar. Power would be purchased from utility districts based on availability and market conditions. Nearly all of the energy used by the project will be returned to the grid at a later time when water is released through the turbines to the lower reservoir to generate energy. Therefore, operational electricity use in the proposed project would not result in a significant adverse impact due to the low energy use rates, availability of local resources, and return of energy used by the proposed project.

Figure 4.4 1
Energy Use and Generation of the Proposed Project



All energy storage systems have inherent levels of inefficiency due to losses to mechanical friction, hydrological head loss in channels, electrical resistance, or other sources. The rated generating capacity of the proposed project is 1,200 MW. The efficiency of the energy storage system was calculated from the amount of energy available from discharge of water through the powerhouse, compared to the amount of energy required to pump water to the upper reservoir, expressed as a percentage. The analysis in Appendix E estimated the range of net efficiency of the proposed project would be 70% to 85%. This is a relatively efficient energy storage technology (refer to the *Energy Resource Analysis Report* in Appendix E for efficiency comparisons). Therefore, no significant adverse impacts are expected related to the net efficiency of energy use in operations.

The analysis in Appendix E also determined that energy use in the proposed project would be consistent with the Klickitat County Energy Overlay Zone (codified in Klickitat County Code Chapter 19.39), WAC Title 194 regulations administered by the Washington Department of Commerce (Energy), and WAC 51.11C that outlines the Washington State Energy Code. Therefore, no significant adverse impacts are expected related to local and regional energy plans.

Indirect Impacts

Indirect impacts from operation include service vehicle and employee vehicle travel to nearby locations outside the proposed project boundary. Operation of the proposed project would require approximately 40 to 60 employees. Up to half of these workers are assumed to be from Klickitat County, with the remaining residing elsewhere in Washington or in Oregon (FFP 2020a). The amount of fuel products anticipated to be consumed would not be expected to adversely affect locally available resources. Therefore, there would be no significant adverse impacts with respect to off-site energy use during operation.

The project would influence the energy flow at the interconnection point to the surrounding electrical grid. The analysis in Appendix E determined that additional reinforcement is not necessary for transmission infrastructure near the interconnection point. Therefore, the proposed project would have no significant adverse impacts on adjacent energy sources with respect to energy flow fluctuations.

4.4.2.3 Proposed Mitigation Measures

No mitigation measures would be required because there would be no significant adverse impacts. Although not required to reduce any significant impacts, mitigation may be proposed by the Applicant to increase energy efficiency of construction and operational processes to reduce potential impacts. Refer to Section 3.3.4 of Appendix E for more information about potential mitigation strategies.

There may also be specific conditions required by regulatory agencies as part of permitting for the proposed project. The main permit related to energy would be the FERC License for a Major Unconstructed Project. An application for this permit was submitted by the Applicant in June 2020 and is currently being considered by FERC as FERC Project No. 14861. A permit pursuant to Washington Energy Code may also be required to ensure compliance with the provisions of WAC 51.11C: State Building Code Adoption and Amendment of the 2018 Edition of the International Energy Conservation Code, Commercial.

4.4.2.4 Significant and Unavoidable Adverse Impacts

There would be no significant and unavoidable adverse impacts related to energy resources from construction or operation of the proposed project.

4.4.3 Findings for the No Action Alternative

Under the No Action Alternative, the proposed project facilities would not be constructed. The wind energy project and other existing energy infrastructure in the study area would continue to be operated. Local and regional energy plans, including the Klickitat County Energy Overlay Zone (codified in Klickitat County Code Chapter 19.39), would remain in place. Investigation of contamination and development of cleanup actions for the CGA smelter site would continue through a separate MTCA cleanup process. A cleanup action could involve some energy use during construction; however, the magnitude of energy use is not precisely estimated due to uncertainties in the extent of cleanup work that would be required. No significant adverse impacts related to energy resources would be expected from the No Action Alternative.

4.5 Public Services and Utilities

Public services and utilities include basic services and facilities that support development and protect public health and safety. The public services evaluated include fire and emergency response, law enforcement, hospitals, emergency management, and public schools. The utilities evaluated include electrical power, water, water supply, wastewater, natural gas, solid waste services, and telecommunications. This section describes the current services and facilities in the study area and potential impacts and mitigation measures related to public services and utilities.

Key Findings of the Public Services and Utilities Analysis

The analysis found the proposed project would have **no significant and unavoidable adverse impacts** related to public services and utilities.

Increases in demand for services and utilities are not expected to exceed the capacity of the public service and utility providers.

The addition and relocation of utility infrastructure during construction would not impact existing utility infrastructure.

Some public services could be temporary disrupted with construction-related traffic or road detours.

Mitigation is not required to reduce any significant impacts.

The proposed project would be within distinct service areas within Klickitat County for fire protection and emergency response, hospitals, schools, and law enforcement, as discussed in the following sections. Therefore, the study area for public services is limited to those service areas serving the project area. The study area for utility providers is the entirety of Klickitat County because the proposed project has the potential to impact utilities throughout the County. Because landfills within Oregon could be used to dispose of contaminated material associated with the MTCA cleanup, the study area for solid waste would extend into Wasco and The Dalles, Oregon. The public service providers that serve the project area and utility providers within Klickitat County are identified in Figure 4.5-1 and discussed in the paragraphs below.

Public Services

The proposed project area is within Klickitat County Fire District 7 for fire and emergency response (Klickitat County 2021a). There are 11 fire stations within Klickitat County Fire District 7, the nearest of which is Hoctor Station 3, approximately 3.9 miles northeast of the project area. Because the project area is within unincorporated Klickitat County, law enforcement and emergency response services would be under the jurisdiction of the Klickitat County Sheriff's Office. The Klickitat County Sheriff's Office is in Goldendale, Washington.

Klickitat County has also adopted a Multi-Jurisdictional Hazard Mitigation Plan (Klickitat County 2020) that plans for responses to natural and man-made hazards by the following eight jurisdictions:

- Central Klickitat, Eastern Klickitat, and Underwood Conservation Districts
- Cities of Bingen, Goldendale, and White Salmon
- Klickitat County
- Klickitat Valley Health

The proposed project area is within Public Hospital District No. 1, which includes Klickitat Valley Health (Klickitat Valley Health 2021), the closest hospital and an approximate 20-mile drive from the proposed project area. The project area is within Klickitat County School District 404 (Klickitat County 2021a). Schools within Klickitat County School District 404 include Goldendale Primary School, Goldendale

Middle School, and Goldendale High School. Goldendale School District No. 404 buses use various roads throughout the County, including SR 14 and Hoctor Road (Goldendale School District No. 404 2021).

Utilities

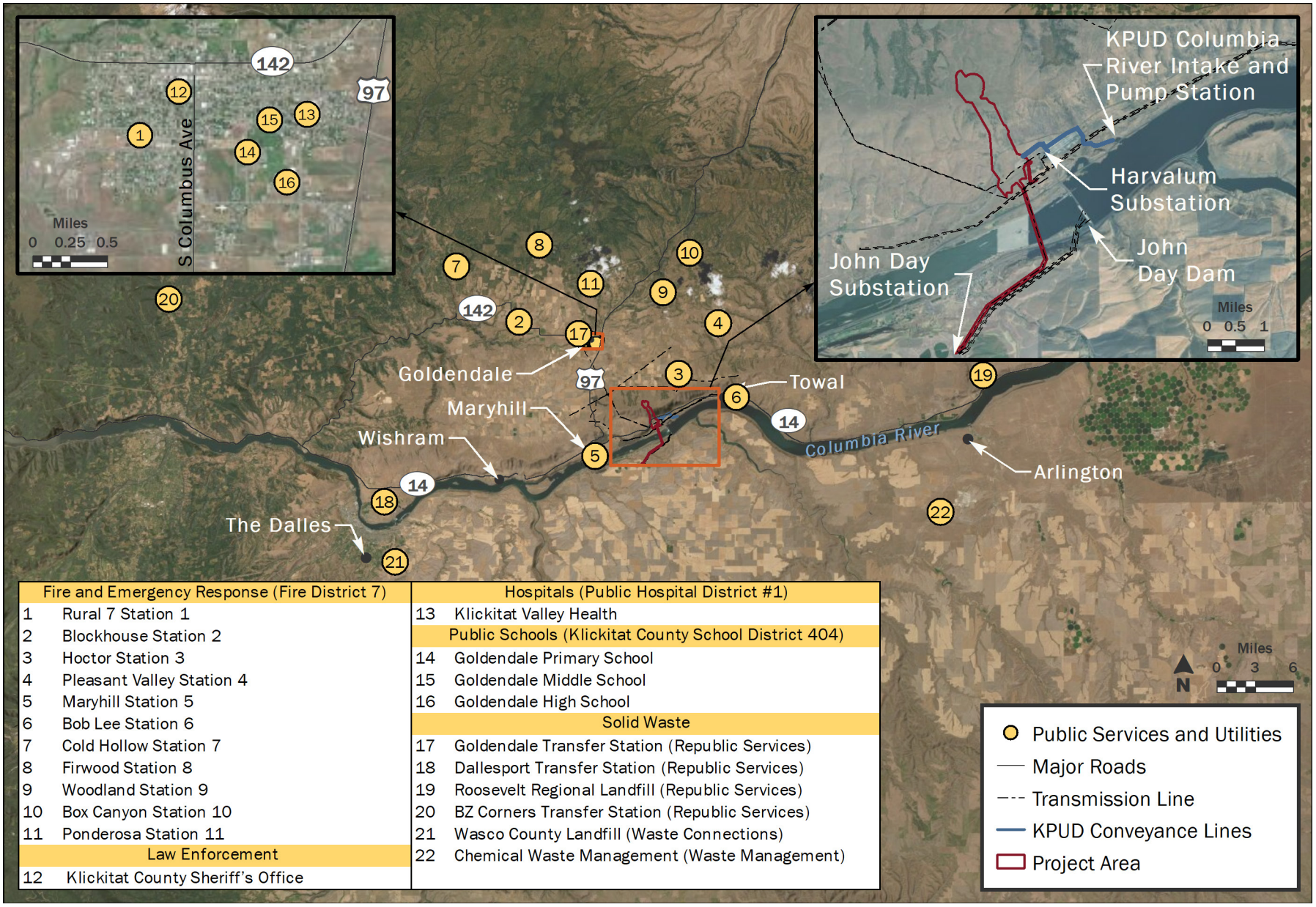
KPUD would provide electricity to the project area by connecting to an existing service connection near the former CGA smelter. KPUD would also provide water to initially fill the project facilities, annual refill water to replace evaporative and leakage loss, and potable water to the project area (FFP 2020a). KPUD's existing industrial water conveyance system includes an intake, pumping facilities, buried piping to two water storage tanks, and a buried 30-inch-diameter steel fill conduit. Water is drawn from the Columbia River to an intake pool that is physically separated from the main channel of the Columbia River by a rock and gravel-filled embankment to support the BNSF railroad (Rye Development 2021a). Water is then drawn into an infiltration gallery by seepage through the rock embankment. The water intake pumps draw water from the bottom of the infiltration gallery. A new water fill line would connect to the existing KPUD water supply service connection in a vault on the northeast side of the lower reservoir.

Trash and recycling would be collected by Republic Services (FFP 2020b). Within Klickitat County, Republic Services owns and operates the Roosevelt Landfill and three transfer stations: Goldendale, Dallesport, and BZ Corners, all of which are shown in Figure 4.5-1 (Republic Services 2021). Once trash and recycling are collected, Republic Services would bring collected waste to the appropriate facility for routing disposal and recycling.

Contaminated soil associated with the MTCA cleanup would be disposed of in accordance with MTCA standards. The location of disposal for contaminated soil would vary based on facility permit requirements and economic factors. Given their proximity to the project area, it is likely that contaminated soil would be disposed of at either Roosevelt Regional Landfill in Klickitat County, the Wasco County Landfill in The Dalles, Oregon, or Chemical Waste Management in Arlington, Oregon. According to the Klickitat County Solid Waste Management Plan, the Roosevelt Regional Landfill has committed to operating through 2032, with three 5-year extensions available (thus ending in 2047) (Klickitat County 2021b). The Wasco County Landfill was last permitted in 2014 and is valid through December 2024 (Oregon DEQ 2014). It is assumed that the Wasco County Landfill would apply for a new operations permit prior to current permit expiration. Chemical Waste Management was opened in 1976, and as of 2017, it was anticipated that this facility had a lifespan of 100 or more years remaining (Waste Management 2017). These landfills are shown in Figure 4.5-1.

Sewer service is generally not available to rural areas in Klickitat County, such as the proposed project area. As such, an on-site septic system would be installed (Klickitat County 2021c). Access to internet and telephone infrastructure can be limited in rural parts of Klickitat County (Klickitat County 2021c). The Applicant would identify these providers at a later time. Natural gas is not proposed to be used as part of construction or operation of the proposed project.

Figure 4.5 1
Public Services and Utilities Study Area



Fire and Emergency Response (Fire District 7)	
1	Rural 7 Station 1
2	Blockhouse Station 2
3	Hoctor Station 3
4	Pleasant Valley Station 4
5	Maryhill Station 5
6	Bob Lee Station 6
7	Cold Hollow Station 7
8	Firwood Station 8
9	Woodland Station 9
10	Box Canyon Station 10
11	Ponderosa Station 11
Law Enforcement	
12	Klickitat County Sheriff's Office

Hospitals (Public Hospital District #1)	
13	Klickitat Valley Health
Public Schools (Klickitat County School District 404)	
14	Goldendale Primary School
15	Goldendale Middle School
16	Goldendale High School
Solid Waste	
17	Goldendale Transfer Station (Republic Services)
18	Dallesport Transfer Station (Republic Services)
19	Roosevelt Regional Landfill (Republic Services)
20	BZ Corners Transfer Station (Republic Services)
21	Wasco County Landfill (Waste Connections)
22	Chemical Waste Management (Waste Management)

Data Source: Klickitat County 2021a

4.5.1 How Impacts Were Analyzed

Public services and utilities within the study area were identified by using information provided by the Applicant, local agency websites, utility and public service provider websites, and Klickitat County GIS data. The analysis qualitatively examined how construction activities and operation of the proposed project could affect public service and utility infrastructure or the demand and provision of public services and utilities. Factors considered for the analysis of impacts with respect to the demand and provision of public services and utilities included the following:

- The relationship of any increased demand for services relative to the existing capacity of providers
- Whether construction or operation would result in a disruption of service or impair access to services

Factors considered for the analysis of potential impacts to public services and utilities infrastructure included the following:

- Whether construction or operation would result in the relocation, replacement, or addition of public services or utility infrastructure
- Whether there would be potential for disruption of services

4.5.2 Findings for the Proposed Project

4.5.2.1 Impacts from Construction

Public Service and Utility Demand and Provision

During the 5-year construction period, there is the potential of intermittent or occasional increases in demand for fire, police, hospital, and emergency services. This would occur due to workers being on site and increased activity during construction. Increases in on-site activity and the increased presence of workers on site could result in accidents, injuries, emergencies, or other incidents where additional fire, police, hospital, or emergency services would be needed. These minor increases are not expected to exceed the capacity of the service providers.

Construction equipment and materials would be delivered to the site by truck, and trucks would be used to transport material excavated from the site to off-site landfills. As described in Section 4.13, Transportation, construction-related traffic would increase near the proposed project throughout the 5-year duration of construction, and road detours could occur. SR 14 and Hoctor Road could be subject to detours and additional traffic due to construction of the proposed project. This could result in the potential for short-term disruption of public services or impaired access to service through delays in emergency response times or delays for children going to school. The Applicant would be required to coordinate construction schedules and any associated road closures with WSDOT and Klickitat County in order to prevent significant disruption of public service provisions. Construction of the proposed project could result in the potential for temporary disruption of service.

Any garbage or waste generated during construction would be collected by Republic Services (FFP 2020b) and brought to the appropriate facility for routing and disposal. Disposal of general construction waste would likely occur at Roosevelt Regional Landfill, which is anticipated to remain in operation through 2047, indicating that this landfill has sufficient capacity to receive construction garbage and waste during the construction period from 2025 to 2030.

Any contaminated soil associated with the MTCA cleanup would be managed and disposed of in accordance with MTCA standards and the Cleanup Action Plan for the site, as further discussed in Section 4.10 and the *Environmental Health Resource Analysis Report*, in Appendix I. Contaminated soils

would likely be disposed of at either Roosevelt Regional Landfill in Klickitat County; the Wasco County Landfill in The Dalles, Oregon; or Chemical Waste Management in Arlington, Oregon. It is anticipated that these facilities would remain in operation beyond the 5-year construction period. This indicates that these facilities have sufficient capacity to receive any contaminated soil associated with the MTCA cleanup, subject to facility permit requirements, actual quantities of contaminated soil to be excavated, and economic factors.

Construction of the proposed project would require the consumption of electricity and water. Electricity used during construction would be provided by KPUD through interconnection to existing infrastructure, and some construction equipment may be operated by diesel generators. It is assumed that any water used during construction would be purchased from KPUD. The water required to fill the proposed project facilities is discussed in Section 4.2. The use of electrical energy is discussed in Section 4.4.
The Applicant has previously coordinated with KPUD to establish service to the project area, and KPUD has confirmed that it could adequately serve the project (FFP 2020a). Construction of the proposed project would increase demand of utility providers but would not exceed the capacity of utility providers and is not anticipated to result in disruption of service.

Therefore, there would be no significant adverse impact on public service and utility demand and provision during construction.

Public Service and Utility Infrastructure

The proposed project would require construction of new utility infrastructure and relocation of existing infrastructure for electrical transmission. A new 5,600-foot-long alignment for both electrical distribution lines around the south side of the lower reservoir would require the relocation of five to six wooden H-frame towers and nine to ten single-pole structures (FFP 2020a). The voltages of the relocated lines would not be changed (FFP 2020a). Any utility disruptions that would result from this relocation would be short term and limited to the time that it would take to complete the relocation.

A new substation and switchyard would be built near the lower reservoir. A transmission line from the proposed underground transformer gallery would be routed to the proposed substation. From the substation, a 4-mile-long aerial transmission line would span south across the Columbia River through an existing BPA right-of-way and connect to the existing John Day Substation. The design of the proposed project's interconnection at the John Day Substation would be finalized by the Applicant during the final design stage, in conjunction with the BPA transmission planning group. Based on BPA's 2019 Interconnection Feasibility Study for the proposed project, the John Day Substation is a feasible connection point for interconnection into BPA's transmission system (BPA 2019).

Construction of the proposed project would also require new connections to utility infrastructure for water conveyance. The proposed project would connect to an existing KPUD industrial water conveyance system. Buried piping leads from the KPUD intake to two industrial water supply tanks. From the water supply tanks, the existing conduit extends into the project area and terminates with a water service shut-off valve in a water supply service vault within the project area. Water conveyance infrastructure associated with the proposed project would connect to the existing conduit within the water supply service vault. Connection of proposed project infrastructure to existing KPUD infrastructure would not be expected to result in disruptions of service.

Given the scale of the proposed infrastructure changes, it is anticipated that the addition and relocation of utility infrastructure during construction could result in the short-term disruption of utility services, but there would not be a significant adverse impact on utility infrastructure.

4.5.2.2 Impacts from Operation

Public Service and Utility Demand and Provision

Operation of the proposed project would require approximately 40 to 60 employees. Up to half of these workers are assumed to be from Klickitat County, with the remaining residing elsewhere in Washington or in Oregon (FFP 2020a). Because up to half of these workers are assumed to already be in Klickitat County, no increase in demand for public services would occur.

Structures within the project area would be required to meet the standards of the FERC Dam Safety protocols. All applicants for hydropower projects under FERC's jurisdiction are required to develop and file an emergency action plan for reservoirs (FERC 2015). The emergency action plan will be shared with local emergency management agencies responsible for developing community emergency response plans. The emergency action plan will include inundation maps identifying high-water areas downstream of the proposed project in the event of a catastrophic structure failure. Local jurisdictions would need to review the plan and the inundation maps and develop evacuation plans for areas downstream as needed, to prepare in the event of a failure of the structure. See Section 4.10, Environmental Health, for more details. Information from the emergency action plan would likely be incorporated into the Klickitat County Multi-Hazard Jurisdiction Plan, which is scheduled for an update in 2025 (Klickitat County 2020). This need for additional planning and preparation is not expected to exceed the capacity of the service providers.

Operation of the proposed project would require the consumption of electricity and water. During operations, electricity would be required from KPUD for general facility operations such as lighting, office operations, and security (FFP 2020b). Additionally, electricity would be needed to pump water from the lower reservoir to the upper reservoir during project operation. Depending on how many pump turbine units are in operation, approximately 300 MW to nearly 1,600 MW would be required to pump water up to the upper reservoir (FFP 2020a). The use of electrical energy is discussed in Section 4.4 and the *Energy Resource Analysis Report*, in Appendix E. It is anticipated that the required energy can be accommodated within the existing capacity of KPUD.

Water for the proposed project's small annual supplemental fills would be drawn from the Columbia River under an existing permit that once served the former CGA smelter (discussed in Section 4.2). It is estimated that the proposed project would require 360 acre-feet of water each year to replenish water lost through evaporation and leakage. Because the Applicant intends to use an existing water right and KPUD has confirmed that it can serve the proposed project under an existing permit, the demand for water associated with project operation would be accommodated within the existing supply of KPUD.

Operation of the proposed project would not result in a disruption of service or impair access to utilities. There would be no significant adverse impact on public service and utility demand and provision during operation.

Public Service and Utility Infrastructure

Operation of the proposed project would not result in the relocation, replacement, or addition of public service or utility infrastructure, and no disruption of services would occur related to infrastructure. Therefore, there would be no significant adverse impact on public service and utility infrastructure during operation.

4.5.2.3 Proposed Mitigation Measures

No mitigation measures would be required because there would be no significant adverse impacts. Specific permit conditions and mitigation actions would be confirmed by regulatory agencies during permitting for the proposed project.

Relevant Mitigation Measures in Other Sections

Although not required to reduce any significant adverse impacts to public services and utilities, implementation of mitigation measures proposed in other sections of this EIS would also further reduce impacts to public services and utilities from construction and operation of the proposed project. The following is a brief summary of the relevant WSDOT-proposed transportation mitigation measure; Section 4.13.2.3 contains a complete description of this measure:

- **Transportation Impact Analysis.** This mitigation measure would also minimize service disruptions and provide advance notice of potential disruptions (see Section 4.13).

4.5.2.4 Significant and Unavoidable Adverse Impacts

There would be no significant and unavoidable adverse impacts related to public services and utilities from construction or operation of the proposed project.

4.5.3 Findings for the No Action Alternative

Under the No Action Alternative, the proposed project facilities would not be constructed. KPUD would continue to hold the existing water right, which may provide water supply to other customers or be placed in trust. The wind energy project and other existing energy infrastructure in the study area would continue to be operated, and electrical distribution lines would not be relocated. Investigation of contamination and development of cleanup actions for the CGA smelter site would continue through a separate MTCA cleanup process. Construction of a cleanup action could result in potential intermittent or occasional increases in demand on public services such as fire, police, hospital, and emergency services, but the cleanup action would not be expected to exceed the existing capacity of these services. No significant adverse impacts to public services and utilities would be expected from the No Action Alternative.

4.6 Aquatic Species and Habitats

This section addresses aquatic species and habitats. Aquatic species are those that require water for some or all of their life cycle. Species discussed in this section include fish, amphibians, and some turtles. Aquatic habitat includes areas that have flowing or still surface water either year-round (perennial), seasonally (intermittent), or for short periods after rainfall or snowmelt events (ephemeral). Aquatic habitats commonly include rivers, streams, lakes, ponds, and wetlands.

The *Aquatic Species and Habitats Resource Analysis Report*, in Appendix F, has the full description of existing conditions, as well as the full analysis and technical details used to evaluate aquatic species and habitats. This section summarizes how impacts were evaluated and the main findings of that report. The species-specific habitat features associated with surface waters are discussed in this section while the surface waters themselves are discussed in Section 4.2, Water Resources.

The study area for aquatic species and habitats includes areas of surface water in or near the proposed project area that provide aquatic habitat. It also includes surface waters and aquatic habitats that are connected to those flowing from the project footprint. The following habitats are included in the aquatic species and habitats study area:

- Surface waterbodies within the project footprint (including streams, ponds, and wetlands; see Figure 4.2-4 in Section 4.2)
- Swale Creek, the receiving stream for drainage from the upper reservoir area, and a perennial tributary to the Klickitat River, an area of major salmon and steelhead production (see Figure 4.2-3 in Section 4.2)
- The segment of the Columbia River adjacent to the proposed project (see Figure 4.2-1 in Section 4.2), which includes the reach of the Columbia River immediately downstream of John Day Dam (also called the Lake Celilo pool), and the reservoir retained by John Day Dam (also called the Lake Umatilla pool)
- Upper and lower reservoirs that would be constructed for the proposed project

Within those areas, the following key features are addressed:

- Surface water that provides habitat for aquatic and amphibious species

Key Findings of the Aquatic Species and Habitats Analysis

The analysis found the proposed project would have **no significant and unavoidable adverse impacts** related to aquatic species and habitats.

Construction would result in the permanent loss of 0.09 acre of existing aquatic habitat and the temporary disturbance of 0.06 acre of aquatic habitat, primarily in the Swale Creek watershed.

Infrequent mortality, injury, and temporary disturbance to amphibians and turtles could occur during the 5-year construction period.

A permanent or multi-year reduction in ecological function would cause indirect effects on aquatic habitat and fish in the Swale Creek watershed.

Aquatic habitat and species in the Columbia River are not anticipated to be affected by the proposed project.

Mitigation is not required to reduce any significant impacts, but mitigation that will be required for impacts to wetlands and waterbodies (see Section 4.2) will reduce potential impacts to aquatic habitat in the Swale Creek watershed. Additional sediment and erosion control plans, construction and operations monitoring and response plans, measures that may be required as part of WDFW's Hydraulic Project Approval process, and the Applicant's VMMP and WMP and WDFW-proposed additions to the WMP, are proposed to further reduce potential impacts.

- State-listed aquatic and amphibious species as designated by the Washington Fish and Wildlife Commission and species identified as candidates for listing by WDFW
- Aquatic and amphibious species listed under the federal Endangered Species Act
- Aquatic and amphibious species that are uncommon across the state or are unique to the Columbia Basin or Middle Columbia River region

The following sections summarize the types of aquatic habitats and the species known to occur in the study area that could be affected by the proposed project. The analysis focused on those identified by the State of Washington as Priority Habitats and Species and federally listed species.

Aquatic Habitats

The State Priority Habitat types that would be affected by the proposed project include instream habitat and freshwater wetlands (WDFW 2019a). Such habitats occur within the existing surface waters and wetlands that are present in the study area and in the downstream waters that receive drainage from those surface waters and wetlands, Swale Creek and the Columbia River. Existing surface waters and wetlands in the study area are described in Section 4.2 and shown in figures in that section.

Instream habitat is defined as the combination of physical, biological, and chemical processes and conditions that interact to provide functional life-history requirements for instream fish and wildlife resources.

Freshwater wetlands are transitional lands between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water at some time during the growing season of each year.

Due to the ephemeral or intermittent and disconnected nature of the waterbodies and wetlands in the proposed project area, they do not likely provide any habitat for fish or turtles. However, they could provide habitat that supports amphibians. Amphibians may migrate among waterbodies during wetter seasons and may become resident in waterbodies that are isolated within the more arid landscape. Amphibian species that may use the habitats include those that commonly occur in the Columbia Basin and eastern foothills of the Cascade Mountains such as long-toed salamander, Woodhouse's toad, Pacific tree frog, Great Basin spadefoot, and American bullfrog. The typical habitat requirements of these species are described in greater detail in the *Aquatic Species and Habitats Resource Analysis Report* (Appendix F).

Although the flowing streams in the northern portion of the study area do not directly provide habitat for fish, they do provide some ecological function to downstream fish habitat in Swale Creek during seasonal connections and possibly in areas of groundwater infiltration. As described in Section 4.2, Water Resources, stream flow patterns in Swale Creek are unique owing to the local geology. Flow in the upper Swale Creek is intermittent. The upper and lower portions of Swale Creek are connected by surface flows in winter and spring when groundwater levels are highest, but hydrologically isolated in April or May through the summer and fall due to seasonal declines in groundwater levels. Aquatic habitat for fish in Swale Creek is limited by this lack of year-round hydrologic connectivity.

Aquatic habitat in Swale Creek is also limited because of temperature impairment. Swale Creek is listed on Ecology's 303(d) list for temperature (Ecology 2021d) with past water quality studies showing exceedances of the temperature criterion of 18°C at all stations monitored (WPN and Aspect 2005). Water quality studies have also shown continuing exceedances of Ecology's Supplemental Spawning and Incubation Criterion for temperature (Ecology 2011) over several weeks during the spring and summer. Additional information on water quality issues in Swale Creek is in Section 4.2, Water Resources, and in the *Surface and Groundwater Hydrology Resource Analysis Report* in Appendix B.

The lowest reaches of Swale Creek are designated critical habitat for the Mid-Columbia steelhead distinct population segment within the Klickitat basin by the National Oceanic and Atmospheric Administration (NOAA) Fisheries (Federal Register [FR] 70.52630) and the reaches are included in a recovery plan for the Klickitat River (NMFS 2009). From its confluence with the Klickitat River upstream to river mile 3.1, Swale Creek has the potential to provide viable habitat for salmon, steelhead, and resident rainbow trout if there were to be channel restoration and enhancement to perennial flows (Inter-Fluve 2002). This viable habitat potential includes winter-run and summer-run steelhead spawning and juvenile rearing, juvenile spring Chinook salmon rearing, and resident rainbow trout spawning, rearing, and resident migration habitat functions (NMFS 2009). The Mid-Columbia Steelhead Recovery plan (NMFS 2009) identifies the area of Swale Creek below river mile 12.22 as a minor spawning area, defined as a "contiguous production areas." However, that plan notes that temperature and low stream flow are likely limiting factors to production. Because upper Swale Creek becomes isolated in summer, movement of juvenile fish into the Klickitat River is restricted and significant mortality likely occurs when temperatures exceed approximately 20°C.

Habitat for steelhead, resident rainbow trout, and resident coastal cutthroat has been identified in the lowest reaches of Swale Creek by Klickitat County (Inter-Fluve 2002), National Oceanic and Atmospheric Administration Fisheries (NMFS 2009), and WDFW (WDFW 2019b, 2021a). Habitats in those portions of Swale Creek are also likely to support common native fish similar to those commonly found in low-order streams of the eastern foothills of the Cascades including longnose dace, speckled dace, redside shiner, peamouth, chiselmouth, northern pikeminnow, bridgelip sucker, largescale sucker, mountain sucker, and torrent sculpin (Wydoski and Whitney 2003). Invasive species that favor warmer water may also use these habitats including sunfish, largemouth bass, and bullhead. The typical habitat requirements of these species are further described in in the *Aquatic Species and Habitats Resource Analysis Report* (Appendix F).

The mainstem middle Columbia River adjacent to the proposed project area is used as a migration corridor and is included as critical habitat for a number of salmon Evolutionarily Significant Units and trout distinct population segments listed under the federal Endangered Species Act (FR 58.68543, 64.57399, 70.52629, 75.63898). Many anadromous salmon species move through the mainstem Columbia River to access habitat in tributaries upstream, and others are resident in the riverine habitat below John Day Dam, or the more lake-type reservoir pool of Lake Umatilla upstream of the dam. Such species include Chinook salmon, sockeye salmon, coho salmon, and steelhead. Chum salmon and pink salmon rarely occur upstream of Bonneville Dam (river mile 146) in the middle Columbia River. Bull trout historically used this section of river for migration but are considered to no longer occur in the mainstem Columbia River, with no adults observed migrating through John Day Dam since recordkeeping started in 1968. The Columbia River is also designated as essential fish habitat for Chinook and coho salmon. Essential fish habitat is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity" (FR 67.2343). Essential fish habitat is protected for species managed for marine fisheries.

The Columbia River Basin also provides habitat for Pacific lamprey and river lamprey migration. Pacific lamprey can migrate upstream many hundreds of miles to complete the freshwater phase of its life cycle in tributary streams to large rivers in Oregon, Washington, Idaho, and British Columbia. Adults migrate back to freshwater between February and June and may spend up to a year in the freshwater habitat before spawning between March and July.

Aquatic habitat in the mainstem Columbia River is highly modified (compared to historic conditions) by the Federal Columbia River Power System, which converted the majority of accessible habitat in the river

to a series of deep, low-velocity pools impounded by hydroelectric dams with little habitat diversity. This includes the sections of river located up- and downstream of John Day Dam, which is adjacent to the proposed project area. Water quality in those sections of the river is impaired (Category 5) for water temperature and pesticides and PCBs in tissue in Lake Umatilla upstream from John Day Dam, and impaired for temperature in Lake Celilo downstream of the dam (Ecology 2021d). Shoreline conditions near the proposed project are highly modified by the dam facility and infrastructure associated with power generation and the former CGA smelter. Little to no riparian vegetation is present, banks are typically armored with large cobble or boulders, and channel complexity is lacking. Therefore, shoreline habitat is typically limited to a narrow band of shallow water along the river's high water mark.

Aquatic Species

Surveys for amphibians, turtles, or other aquatic species have not occurred in the study area but the potential for these species to exist in the study area was assessed based on the habitat types present, habitat preferences for each species, and the known occurrences of some of the species. Lists of the aquatic and amphibious species that could occur in the study area are provided in Attachment 1 of the *Aquatic Species and Habitats Resource Analysis Report* (Appendix F).

Amphibians that could occur in the study area include those that rely on still water such as ponds or slow-moving streams to lay eggs, including long-toed salamander, Pacific treefrog, Woodhouse's toad, western toad, and the invasive American bullfrog. Amphibians found in dry areas such as grasslands and prairies could also potentially occur in the study area, such as the Great Basin spadefoot toad. The Oregon spotted frog, a federally listed threatened species and state-listed endangered species that has been eliminated from the majority of its historic range, is unlikely to occur in or near the proposed project.

Native aquatic turtle species that could occur in the study area include western pond turtle, a state-listed endangered species. However, due to the disconnected and ephemeral/intermittent nature of the waterbodies in the proposed project area, the western pond turtle is unlikely to occur.

Fish species known to be present in Swale Creek and the larger Klickitat River subbasin are noted in the previous habitat section. Migratory and resident fish species also occur in the mainstem middle Columbia River and its tributaries, as noted in the previous habitat section. Of the Columbia River salmon species, Chinook salmon, chum salmon, sockeye salmon, steelhead, and bull trout are Candidates on the State Priority Species List (WDFW 2019a). Federal Endangered Species Act-listed salmon Evolutionarily Significant Units and trout distinct population segments in the mainstem middle Columbia River adjacent to the proposed project area include the following populations:

- Upper Columbia River Evolutionarily Significant Unit spring Chinook salmon: Endangered; 1999 (FR 64.14308), 2005 (FR 70.37159), updated 2014 (FR 79.20802)
- Snake River spring/summer-run Evolutionarily Significant Unit Chinook salmon: Threatened; 1992 (FR 57.14653), 2005 (FR 70.37159), updated 2014 (FR 79.20802)
- Snake River fall-run Evolutionarily Significant Unit Chinook salmon: Threatened; 1992 (FR 57.14653), 2005 (FR 70.37159), updated 2014 (FR 79.20802)
- Middle Columbia River distinct population segment steelhead: Threatened; 1999 (FR 64.14517), 2006 (FR 71.833), updated 2014 (FR 79.20802)
- Upper Columbia River distinct population segment steelhead: Threatened; 1997 (FR 62.43937); reclassified to Threatened 2006 (FR 71.833) and 2009 (FR 74.42605); updated 2014 (FR 79.20802)
- Snake River distinct population segment steelhead: Threatened; 1997 (FR 62.43937), 2006 (FR 71.833), updated 2014 (FR 79.20802)

- Snake River Evolutionarily Significant Unit sockeye salmon: Endangered; 1991 (FR 56.58619), 2005 (FR 70.37159), updated 2014 (FR 79.20802)
- Columbia River distinct population segment bull trout: Threatened; 1999 (FR 64.58910)

Bull trout and steelhead are State Candidate species for Endangered Species Act listing, and bull trout and Mid-Columbia steelhead are listed as Species of Greatest Conservation Need in the Washington State Wildlife Action Plan (WDFW 2015). Salmon and trout are included in the State Priority Species List to protect vulnerable aggregations and as species of recreational, commercial, and/or Tribal importance.

Pacific lamprey is another important anadromous species of the Columbia River Basin. Another less common lamprey species, the river lamprey, also uses the Columbia River for migration. Pacific lamprey and river lamprey are included as Species of Greatest Conservation Need in the Washington State Wildlife Action Plan (WDFW 2015) and as Species of Tribal Importance (WDFW 2019a). River lamprey are listed as a State Candidate species (WDFW 2019a). Both Pacific and river lamprey are listed by USFWS as Federal Species of Concern (USFWS 2010, 2018).

The American shad is by far the most abundant invasive fish species in the Columbia River, with numbers increasing dramatically since the mid-1970s. Adult American shad now constitute the largest single run of any anadromous fish in the Columbia River, including wild and hatchery-origin salmon (Hasselman et al. 2012). Other non-native fish species that occur the Columbia River Basin include centrarchids, or fish from the sunfish family including smallmouth bass. Other abundant invasive fish species include walleye, crappie, yellow perch, and members of the carp or bullhead family.

White sturgeon are well documented upstream of John Day Dam in Lake Umatilla. White sturgeon are not state or federally listed; however, they are included in the State List of Species of Greatest Conservation Need (WDFW 2015) and are included in the State Priority Species List (WDFW 2019a) to protect vulnerable aggregations, and they are a species of recreational, commercial, and Tribal importance.

An abundant resident fish population occurs in the middle Columbia River and its tributaries including mountain whitefish; various sculpin species including prickly sculpin and torrent sculpin; various minnow species including redside shiner, longnose dace, leopard dace, speckled dace, northern pikeminnow, peamouth, and chiselmouth minnow; and suckers including largescale sucker, longnose sucker, bridgelip sucker, and mountain suckers. Of these species, leopard dace and mountain sucker are listed by WDFW as Species of Greatest Conservation Need (WDFW 2015) and as State Candidate species (WDFW 2019a).

Uncommon native resident species that are known to occur in adjacent reaches or tributaries to the middle Columbia River (such as the lower Yakima and lower Snake rivers) include western river lamprey, burbot, Umatilla dace, Paiute sculpin (a State Candidate species for listing), reticulate sculpin, mottled sculpin, threespine stickleback, longnose sucker, and sand roller. Non-native species that may rarely occur include channel catfish, western mosquitofish, tench, and largemouth bass.

4.6.1 How Impacts Were Analyzed

Potential impacts were identified for the aquatic species and habitats known to occur in the study area. The analysis focuses on the health and uniqueness of species populations and habitat functions that support those species. The impact analysis for aquatic species and habitats considered the changes to habitat quantity and habitat function. Impacts on aquatic habitat include those that cause the loss of habitat or reduce the ecological function of that habitat by changing water quantity, water quality, riparian area

condition, prey abundance, interactions with non-native species, or other key functional elements. Impacts on aquatic species include those that may cause disturbance, injury, or mortality to aquatic species.

The magnitude of effects can depend on the duration, frequency, and permanence of the impact and whether the habitat or species affected is federally listed under the Endangered Species Act or has special status in the State of Washington. Impacts from construction were evaluated for their relatively short-term effects, as well as any longer-term effects that persist after the expected 5-year construction period has ended. Impacts from operations were evaluated for the remaining 45-year expected duration of the initial project operating license. More information on how impacts were analyzed can be found in the *Aquatic Species and Habitats Resource Analysis Report* (Appendix F).

4.6.2 Findings for the Proposed Project

4.6.2.1 Impacts from Construction

Aquatic Habitat in Swale Creek Watershed

As described in Section 4.2, Water Resources, construction of the proposed upper reservoir would remove and permanently cover portions of streams and wetlands including Stream S7, Stream S8, Stream 1, and Pond/Wetland P2. Streams would also be disturbed and compacted due to their location within the temporary construction staging area. Effects of construction on these waterbodies would result in degradation of ecological function of the aquatic habitat, including native animal and plant diversity in the riparian areas, water temperature regulation, erosion control, water infiltration, and organic inputs to the aquatic food web. The impacts to these waterbodies would eliminate wetland functions and aquatic habitat and result in degradation of ecological functions in downstream waters. However, the overall level of lost function and habitat would likely be minimal given the relatively small size of the affected areas and the limited ecological function and aquatic habitat that they currently provide. The Applicant has proposed preparation of a mitigation plan for those impacts that will be submitted to and approved by USACE and Ecology as a component of the Clean Water Act-related permitting required for the project. WDFW's Hydraulic Project Approval process would include conditions intended to minimize impacts to instream and riparian habitat and functions for the intermittent streams S7 and S8. The mitigation that will be required for impacts to wetlands and waterbodies (see Section 4.2) will reduce potential impacts to aquatic habitat in the Swale Creek watershed. Additional measures may be required as part of permitting, and mitigation measures are described in Section 4.6.2.3 to further reduce potential impacts. There would not be a significant adverse impact on aquatic habitat in the Swale Creek watershed.

Aquatic Habitat in Columbia Tributaries Watershed and the Columbia River

No direct impacts are anticipated on aquatic habitat areas of flowing water draining to the Columbia Tributaries watershed during construction in the lower reservoir area. No in-water work is proposed for the Columbia River.

Construction of the lower reservoir would result in excavation and backfilling a portion of a wetland, affecting the wetland and requiring restoration following construction. These permanent and temporary losses of wetland areas would have a minimal effect on aquatic habitat in these wetlands and would be mitigated according to regulatory requirements. Therefore, there would be no significant adverse impact.

Amphibians and Turtles

Excavation and backfilling in streams, ponds, and wetlands may cause mortality, injury, or disturbance to the normal behavior of amphibians or turtles using these habitats or their young, especially for tadpoles that are not able to move out of the area being disturbed. Activities that generate high levels of noise and vibration that exceed background levels, such as blasting to construct the reservoirs and powerhouse, or

drilling to construct water conveyance tunnels, may cause temporary disturbance to normal species behaviors during the construction period. Impacts are greater for noise that increases sharply, such as with blasting. The potential for infrequent mortality, injury, and temporary disturbance to amphibians during the 5-year construction period would result in adverse impacts on amphibians or turtles, but these impacts would not be significant.

Fish

Streams closest to construction are not fish-bearing streams and are located at least 15 river miles upstream of the fish-bearing portion of Swale Creek. As a result, no direct impacts on fish would occur during construction of the upper reservoir.

Major noise-generating work such as blasting or drilling to construct the underground components of the project (e.g., tunnels, powerhouse, and reservoirs) may cause noise to be transmitted to the water depending on the local geology. This would occur at a distance from the Columbia River that would limit noise transmission to a level that is not likely to cause disturbance to fish in the Columbia River. Stormwater runoff resulting from construction of the lower reservoir and proposed substation would not directly affect the water quality in the Columbia River with appropriate BMPs proposed by the Applicant.

Construction of the proposed project is not expected to directly impact fish nor critical habitat for any listed fish species.

Indirect Impacts

As previously discussed, there would be a permanent or multi-year reduction in ecological function associated with loss or degradation of ephemeral and intermittent stream habitats and hydrologically connected areas downstream. This would result in some indirect effects on aquatic habitat and fish in the Swale Creek watershed unless mitigated with compensatory mitigation and restoration actions as noted for direct impacts. This would not result in a significant adverse impact.

The drawdown of groundwater during construction could lead to temporary dewatering of connected seeps and surface waters, as described in greater detail in the *Surface and Groundwater Hydrology Resource Analysis Report* (Appendix B). This effect could be moderated if groundwater is returned to the shallow aquifer on site. No other indirect impacts on aquatic habitat in the Columbia River, fish, amphibians, or turtles due to construction of the proposed project are anticipated. The proposed project would also not indirectly affect salmon and steelhead predators including orca.

4.6.2.2 Impacts from Operation

Aquatic Habitat in Swale Creek Watershed

The proposed upper reservoir would capture precipitation and groundwater recharge that would otherwise flow to the Swale Creek watershed. However, as discussed in Section 4.2, Water Resources, due to underground leakage from the water conveyance infrastructure between the two reservoirs, there would be a net gain in water flow to the Swale Creek watershed. The change in water quantity to these habitats would result in a minimal effect in the Swale Creek watershed, and any adverse impacts would not be significant.

Aquatic Habitat in Columbia Tributaries Watershed and the Columbia River

The proposed lower reservoir would capture precipitation and groundwater recharge, which would be offset by leakage from water conveyance infrastructure (see Section 4.2, Water Resources). Under current conditions, most of the incident precipitation likely infiltrates versus becoming runoff. This change in runoff infiltration to groundwater would not result in a significant adverse impact to aquatic habitat. Given that changes to hydrologic inputs to the river as a result of additional groundwater would be small

or undetectable, no direct impacts of operation are anticipated on the Columbia Tributaries watershed or aquatic habitat in the Columbia River.

Amphibians and Turtles

Amphibians that occur in the natural aquatic habitats are not likely to be disturbed, injured, or killed by project operations or disturbed by noise and vibration from the operating facility. Operation of the reservoirs could entrain, injure, and kill tadpoles or adult amphibians if they were to colonize the reservoirs. The Applicant has proposed wildlife deterrent measures that may reduce the attractiveness of this low-quality habitat for aquatic species. The presence and operation of the upper and lower reservoirs is not expected to result in significant adverse impacts to amphibians and turtles.

Fish

Surface waters within the study area are not fish-bearing and adequate protection to the waters and shorelines of the Columbia River during operations is expected, consistent with local, state, and federal regulation. Project operations would not involve work in the Columbia River, nor would the project create new barriers to fish movement in the Columbia River. No direct impacts of operation are anticipated on fish.

Indirect Impacts

No indirect impacts are anticipated on aquatic species or habitats from project operations.

4.6.2.3 Proposed Mitigation Measures

As part of a FERC FLA, the Applicant has proposed to follow industry standard BMPs. These would be documented in a Soil Erosion Control Plan and Stormwater Pollution Prevention Plan to mitigate for the potential effects of erosion and sedimentation on waterbodies, and therefore on aquatic species and habitats (FFP 2020a). These measures would be enforced as part of Clean Water Act permits.

WDFW's Hydraulic Project Approval process would include conditions intended to minimize impacts to instream and riparian habitat and functions for the intermittent streams. Compensatory mitigation for unavoidable impacts on aquatic species and habitats would also be addressed in coordination with WDFW through development of the Applicant's Vegetation Management and Monitoring Plan (VMMP; FFP 2020e) and WMP (FFP 2020c). The surface waters affected (Streams S7 and S8) are not fish-bearing and there would be no direct impacts on fish or critical habitats for special status species. Therefore, consultation with National Oceanic and Atmospheric Administration Fisheries, USFWS, or federal, state, and Tribal fisheries co-managers for impacts on salmon, steelhead, and bull trout is not anticipated. Due to the proximity of the project to the Columbia River, however, some level of consultation may be required.

Compensatory mitigation for impacts on wetlands and regulated waters would be addressed through the Clean Water Act Section 404 Permit process for federally jurisdictional wetlands, the Section 401 Water Quality Certification process, Ecology's Administrative Order process under RCW 90.48 of the Washington Water Pollution Control Law for non-federally regulated waters, and WDFW's Hydraulic Project Approval process for intermittent streams. Those permit-required mitigation measures would also protect aquatic species and habitats and are aligned with Applicant recommendations documented in the Applicant's FERC FLA for the protection of aquatic species and wildlife resources (FFP 2020a, Exhibit E, Sections 3.1.3 and 3.2.3). Those permit-required mitigation measures are summarized in Section 4.2 and described in further detail in the *Wetlands and Regulated Waters Resource Analysis Report* (Appendix C).

WDFW-Proposed Mitigation Measures

The Applicant proposed several mitigation measures to reduce impacts on terrestrial species and habitats in their draft VMMP (FFP 2020e) and draft WMP (FFP 2020c). Drafts of the VMPP and WMP were

developed in coordination with USFWS, WDFW, and the Oregon Department of Fish and Wildlife and are being revised in coordination with those agencies. Once finalized, those plans will be included as articles of the FERC license and will be enforced with other license requirements. Section 4.7.2.3 and the *Terrestrial Species and Habitats Resource Analysis Report* (Appendix G) contain a more complete description of the Applicant's draft VMMP (FFP 2020e) and draft WMP (FFP 2020c).

WDFW proposes the following additions to the WMP to help identify and mitigate for potential impacts to aquatic species and habitats. Ecology supports these additional measures, which are expected to be included in revisions to the WMP through ongoing agency coordination:

- **Wildlife Surveys to Include Aquatic Species.** Scientifically based wildlife surveys described in the draft WMP would focus on recording observations of birds, mammals, and reptiles. To determine the potential presence of state or federally listed aquatic species such as Oregon spotted frog, western toad, and western pond turtle, observations of amphibians, turtles, and other aquatic species should also be recorded when they are encountered during wildlife surveys. These species would also be included in the Wildlife Incident Reporting System measures in the WMP.

- **Amphibian Salvage During Construction.** If state or federally listed aquatic species, including Oregon spotted frog, western toad, and western pond turtle, are present on the site, proposed BMPs will be used for the salvage and translocation of amphibians out of surface waters to be excavated or backfilled during construction.

Relevant Mitigation Measures in Other Sections

In addition to the permit-required and WDFW-proposed measures, implementation of mitigation proposed in other sections of this EIS would also further reduce potential effects of the proposed project and protect aquatic species and habitats.

The following is a brief summary of Ecology-proposed water resources mitigation measures; Section 4.2.2.3 and the *Surface and Groundwater Hydrology Resource Analysis Report* (Appendix B) contain complete descriptions of these measures:

- **Construction Water Resource Monitoring and Response Plan.** This mitigation measure for the protection of water quantity and water quality during construction would also protect aquatic species and habitats (see Section 4.2).
- **Operations Water Resource Monitoring and Response Plan.** This mitigation measure for the protection of water quantity and water quality during operations would also protect aquatic species and habitats (see Section 4.2).

The following is a brief summary of an Applicant-proposed mitigation measure to reduce impacts on terrestrial species and habitats; a summary of the VMPP is provided in Section 4.7.2.3 and the *Terrestrial Species and Habitats Resource Analysis Report* (Appendix G):

- **The Applicant's Draft Vegetation Management and Monitoring Plan.** The Applicant proposed several mitigation measures to reduce impacts on terrestrial habitat and species in their draft VMMP (FFP 2020e) (see Section 4.7). Measures in the VMMP that would also protect aquatic species and habitats include planting, post-construction restoration, noxious weed management, and measures that would include preventing the establishment of woody riparian vegetation at reservoir edges to reduce the attraction of riparian-dependent species to the reservoir.

4.6.2.4 Significant and Unavoidable Adverse Impacts

The analysis found the proposed project would have no significant adverse impacts to aquatic species and habitats. Mitigation that will be required for impacts to wetlands and waterbodies (see Section 4.2)

will reduce potential impacts to aquatic habitat. Additional measures may be required as part of permitting, and measures are described in Section 4.6.2.3 to further reduce potential impacts. There would be no significant and unavoidable adverse impacts on aquatic species and habitats from construction or operation of the proposed project.

4.6.3 Findings for the No Action Alternative

The No Action Alternative represents the future aquatic habitat conditions within the study area in the absence of implementing the proposed project. KPUD would continue to hold the existing Cliffs water right, which may provide water supply to other customers or be placed in trust. The wind energy project and other existing energy infrastructure in the study area would continue to be operated. Investigation of contamination and development of cleanup actions on the CGA smelter site would continue through a separate MTCA cleanup process.

In the absence of the proposed project fully removing the WSI, it is unknown what cleanup action would be required for the WSI through the full site cleanup process, which is underway. For purposes of evaluating the No Action Alternative, it is assumed that the WSI would remain intact and continue to be monitored and maintained under the existing closure plan. However, the WSI would remain within the ongoing MTCA cleanup process for the smelter site and could be subject to additional remedial actions potentially requiring long-term stewardship measures, monitoring, and land-use restrictions that would be expected to be part of the cleanup plan.

A cleanup action could improve overall conditions for aquatic species and habitats, but could involve impacts on aquatic habitats from water diversions, cut and fill, vegetation disturbance, and increased noise and vibration. These could lead to additional mortality, injury, and temporary disturbance to amphibians and turtles. Any cleanup action that would require excavation or placement of fill material into a wetland or water would follow the required Clean Water Act Section 404 permit process, which would include mitigation requirements. Other state and local permits would also be required, which would also require mitigation for unavoidable impacts.

Overall, any impacts on the existing quantity and ecological function of aquatic habitat within the study area are expected to be minor. Through compliance with laws and with implementation of appropriately determined mitigation measures, there would be no significant adverse impacts related to aquatic species and habitats from the No Action Alternative.

4.7 Terrestrial Species and Habitats

This section addresses terrestrial species and habitats. Terrestrial habitats refer to non-aquatic or upland areas of the landscape that support land-dwelling plants and animals. Examples include forests, grasslands, deserts, shorelines, and underground habitats like caves and burrow systems. Terrestrial species are plants or animals that live on or use these habitats for the majority of their life functions. Examples of terrestrial plants include trees, shrubs, and herbs that prefer upland or riparian habitats. Examples of terrestrial wildlife include mammals, birds (including waterfowl), invertebrates, and reptiles. In this EIS, amphibians and turtles that live in or near water are addressed in Section 4.6, Aquatic Species and Habitats.

The *Terrestrial Species and Habitats Resource Analysis Report* (Appendix G) has the full description of existing conditions, as well as the full analysis and technical details used to evaluate terrestrial species and habitats. This section summarizes how impacts were evaluated and the main findings of that report.

Key Findings of the Terrestrial Species and Habitat Analysis

The analysis found the proposed project would have **no significant and unavoidable adverse impacts** related to terrestrial species and habitats, **with inclusion of mitigation to reduce significant impacts**.

Direct and indirect impacts on special status species—including golden eagle, little brown bat, western gray squirrel, smooth desert parsley, and other rare plants—would be addressed through permit requirements and mitigation measures to reduce impacts.

Construction would result in the permanent loss of 193.6 acres of existing habitat and the temporary disturbance of 54.3 acres of habitat. Operation would indirectly impact habitat function and quality for some species.

Plants, mammals, reptiles, and invertebrates could experience mortality and birds could experience disturbance during the 5-year construction period, but species viability would not be impacted.

The study area for terrestrial species and habitats is defined as the terrestrial environments with the potential to be affected by construction and operation of the project. It includes the project area plus a 0.6-mile offset from the project area boundary to include the typical range for wildlife. The study area also includes vertical air space up to 650 feet above ground that is typically used by birds, bats, and other flying species and a vertical distance of up to 6.5 feet below ground that may be used by burrowing species. Nearby nesting areas of sensitive bird and bat species that frequently use air space and resources found in the proposed project footprint are also considered to be part of the study area.

The following key features are addressed in this section:

- Terrestrial species and habitats
- Species listed under the Endangered Species Act and Washington State species of concern (listed and candidate species)
- Unique, priority, and culturally important species
- Wildlife migration routes

Terrestrial Habitats

The study area occurs within the Columbia Plateau Ecoregion, which contains a number of habitat types that are characteristic of the semi-arid and temperate climate of this portion of Washington State (WDNR 2015). The seven major habitat types in the study area are summarized in Table 4.7-1 and locations are shown in Attachment 1 of the *Terrestrial Species and Habitats Resource Analysis Report* (Appendix G).

Table 4.7-1
Washington Department of Natural Resources Natural Heritage Program Habitat Types within the Study Area

HABITAT TYPE	DESCRIPTION[1]	CONSERVATION STATUS[1,2]
Columbia Plateau Steppe and Grassland	Forbs typically average 25% cover, and shrubs average 10% cover. Soils vary from deep and well-drained to shallow with a microphytic crust. This habitat type supports a variety of grasses and forbs, while disturbed stands may contain rabbitbrush, sagebrush, and other disturbance-tolerant shrubs.	Imperiled (S2)
Columbia Plateau Scabland Shrubland	Consists of low, xeric shrubs and grasses on sites with little soil development and extensive exposed rock, gravel, or compacted soils. Annual species may be seasonally abundant, and cover of moss and lichen is often high (e.g., 1% to 60% cover). Biological soil crust cover is considered to be high.	Secure (S5)
Inter-Mountain Basins Cliff and Canyon	Consists of steep cliff faces, narrow canyons, unstable scree and talus slopes, and rock outcroppings with very sparse vegetation. Some denser vegetation areas on unstable scree and talus slopes directly below cliff faces can occur. May support a variety of trees, shrubs, and forbs despite the steep, unstable environment.	Secure (S5)
Inter-Mountain Basins Big Sagebrush Steppe	Grassland with an open to moderately dense shrub cover, varying from 5% to 40%. Dominated by perennial bunchgrasses and forbs.	Imperiled (S2)
Columbia Plateau Western Juniper Woodland and Savanna	Woodlands and savannas dominated by western juniper ranging from eastern Klickitat, southern Benton, and Franklin counties. Restricted to areas with excessively drained soils, such as sand dunes, rock outcrops or escarpments.	Vulnerable (S3S4)
Introduced/Invasive Annual Grassland	May have formerly been Columbia Plateau Steppe and Grassland, but now dominated by invasive species such as cheatgrass. Some native species may still be present. May occur in areas with and without rocky outcropping in the study area.	None
Introduced/Invasive Wooded	Patches of native and non-native tree species in previously developed areas that could be planted or volunteer.	None

Notes:
1. Habitat type descriptions and conservation status are from WDNR 2015.
2. Conservation status codes are as follows; two codes express a range rank indicating conservation status uncertainty:
   - S2 At high risk of extirpation in Washington due to restricted range, few occurrences, steep declines, severe threats, or other factors.
   - S3 At moderate risk of extirpation in Washington due to a fairly restricted range, relatively few occurrences, recent and widespread declines, threats, or other factors.
   - S4 At a fairly low risk of extirpation in Washington due to an extensive range and/or many occurrences but with possible cause for some concern as a result of local recent declines, threats, or other factors.
   - S5 At very low or no risk of extirpation in Washington due to a very extensive range, abundant occurrences, with little to no concern from declines or threats.

The northern portion of the study area where the upper reservoir would be constructed generally consists of rolling hills occupied by grasslands and shrub-steppe habitat types. Disturbance from development is limited in that location and primarily includes wind farm developments with multiple wind turbines, a network of connecting gravel access roads, and associated infrastructure. The southern portion of the study area where the lower reservoir and associated power transmission infrastructure would be constructed is composed of previously developed or disturbed land, including lands occupied by former smelter operations and lands crossed by major roads such as SR 14. Most of the habitat in that portion of

the study area consists of introduced/invasive annual grasslands intermixed with rock outcroppings and developed areas (FFP 2020a; Anchor QEA 2021).

Notable habitat types present in the study area include the following (more detailed descriptions are in the *Terrestrial Species and Habitat Resource Analysis Report* in Appendix G). Note that no designated critical habitat for terrestrial species occurs within the study area.

- **Rare Plant Habitat.** Areas between the northern and southern portions of the study area and around the site of the upper reservoir contain the following distinctive rare plant habitats (RPHs) capable of supporting listed endangered, threatened, and sensitive plant species (FFP 2020f; Figures 4.7-1a and 4.7-1b):
  - **RPH-1** is characterized by seeps and ephemeral streams in both the upper and lower reservoir portions of the study area, with some areas suitable for state endangered California broomrape, and state sensitive smooth goldfields and state sensitive Nuttall's quillwort.
  - **RPH-2** is along steep south-facing talus slopes in the center of the study area, with sparse vegetation in the higher elevations of this area with greater vegetation cover on the scree and talus slopes below the cliffs. Desert parsley was observed, but none were identified as the state threatened and Tribally important species smooth desert parsley or the state sensitive species Suksdorf's desert parsley.
  - **RPH-3** is at the top of the escarpment along the southern edge of the upper reservoir area, suitable for smooth desert parsley, Douglas' draba, and hot-rock penstemon.
  - **RPH-4** is across the steep south-facing middle slope of the study area, characterized by an open shrub layer interspersed by herbaceous plants, suitable for smooth desert parsley, and mixed pine stands of western juniper and ponderosa pine create seasonally moist microsites suitable for state sensitive few-flowered collinsia and state sensitive common bluecup.
  - **RPH-5** is a wetland area associated with a seep just above SR 14 and directly adjacent to an area of RPH-1, suitable for state sensitive western ladies' tresses, Nuttall's quillwort, and smooth goldfields.
  - **Smooth Desert Parsley Area** is located in a study area RPH to the west of the lower reservoir project footprint. Smooth desert parsley is a state threatened and Tribally important plant species. The presence of the species was documented in that location during the Applicant's 2015 habitat survey (FFP 2020a).
- **Air Habitat.** The air habitat over the study area has specific temperature, moisture, wind speed, and turbulence characteristics that make it appropriate for certain wildlife species (Powell 2018; ERM 2021a). This air space is used by birds and bats for soaring, hunting, foraging, and migrating. It is also important for flying and wind-dispersing invertebrates and for seed dispersal for various plants. Soaring raptors, such as golden eagles, rely on wind for lift to reduce energetic costs during flight (Johnston et al. 2014) and the study area ridgelines create air currents that provide lift for soaring birds.
- **Bird Habitat.** The study area is in the Pacific Flyway,[2] one of the main north-south migratory routes used by various bird species. Many migrant bird and raptor species use the Pacific Flyway to migrate between breeding habitat in North America and wintering habitat in the tropics (BirdLife

[2] The Pacific Flyway and Columbia Hills Important Bird Area overlap the entire study area and are therefore not depicted on Figures 4.7-1a and 4.7-1b.

International 2021). The study area also overlaps the National Audubon Society–defined Columbia Hills Important Bird Area, which is known to support several bird assemblages, including 13 or more species of raptor (Cullinan 2001). Waterfowl may also use the ponds and portions of wetlands where water becomes ponded during wet seasons, though the pond habitat within the project area is small in scale (less than 0.5 acre) and low quality for waterfowl foraging or breeding.

- **Mule Deer Habitat.** The study area is within WDFW's East Columbia Gorge Mule Deer Management Zone and the majority of Klickitat County is considered year-round mule deer habitat (WDFW 2016). A winter concentration habitat area is located in central Klickitat County.
- **Priority Habitat.** As shown in Figures 4.7-1a and 4.7-1b and summarized in Table 4.7-2, WDFW's Priority Habitat and Species Mapping identifies seven priority habitat types and features within the study area (WDFW 2008). Although two of the mapped Priority Habitat and Species habitat types include oak habitat, no oak has been documented in the portions of the study area that have been surveyed. Oak may occur in the study area to the west of the upper reservoir. Wetland habitats are discussed in more detail in Section 4.2, Water Resources, and in the *Wetlands and Regulated Waters Resource Analysis Report* (Appendix C).

Table 4.7-2
Washington Department of Fish and Wildlife Priority Habitat and Features and in the Study Area

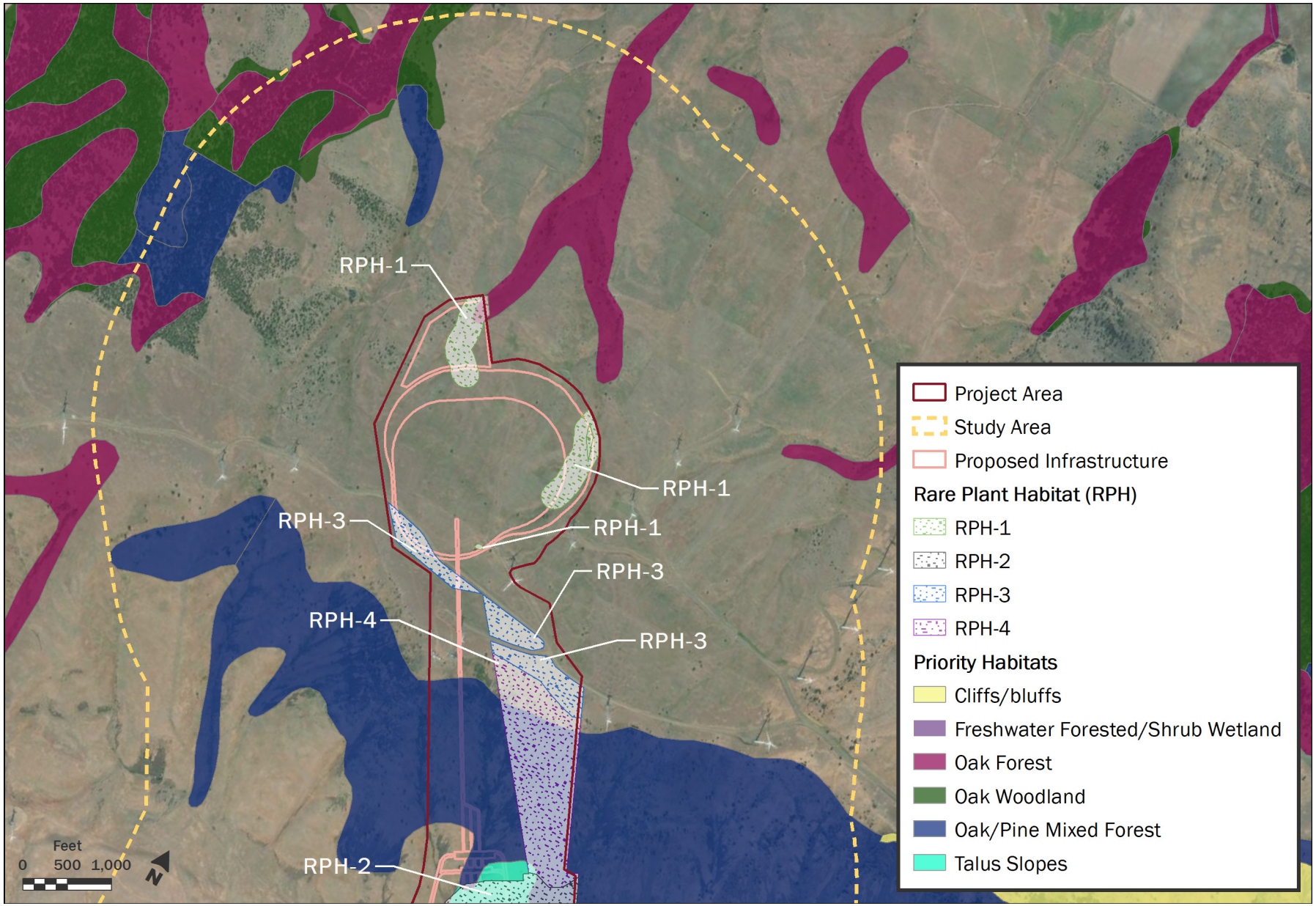
PRIORITY HABITAT AND FEATURES	DESCRIPTION[1]	PRESENT IN STUDY AREA[2]
John Day Talus Slopes	Homogenous areas of rock rubble ranging in average size from 0.5 to 6.5 feet (0.15 to 2.0 meters), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs.	Yes
John Day Cliffs	Greater than 25 feet (7.6 meters) high and occurring below 5,000 feet (1,524 meters).	Yes
Oak/Pine Mixed Forest	Oak/Pine Mixed Forest with 0% to 25% canopy closure. Overlaps with John Day Talus Slope priority habitat feature in the study area.	Documented as mixed pine only. No oak were observed during Applicant's habitat and botanical surveys in the project area, but this habitat type may occur in the upper portion of the study area outside the areas surveyed by the Applicant.
Freshwater Forested/Shrub Wetland	Inland, scrub-shrub, temporarily flooded wetland (USFWS 2021b).	This priority habitat and feature type corresponds with some wetland features delineated during project area field surveys.[3]
Emergent Wetland	Wetland present for most of the growing season in most years and usually dominated by perennial plants (USFWS 2021b).	This PHF type corresponds with some wetland features delineated during project area field surveys.[3]
Oak Forest/Oak Woodland	Pure oak or oak/conifer associations where canopy coverage of the oak component of the stand is 25%; or where total canopy coverage of the stand is <25%, but oak accounts for at least 50% of the canopy coverage present. East of the Cascades, priority oak habitat is stands 2 hectares (5 acres) in size.	Potential presence. No oak were observed during Applicant's habitat and botanical surveys in the project area, but this habitat type may occur in the northwest study area outside the areas surveyed.

PRIORITY HABITAT AND FEATURES	DESCRIPTION[1]	PRESENT IN STUDY AREA[2]
Freshwater Pond	Permanently flooded, man-made wetland area (USFWS 2021b).	Potentially present but not delineated in project area field surveys.[3]

Notes:

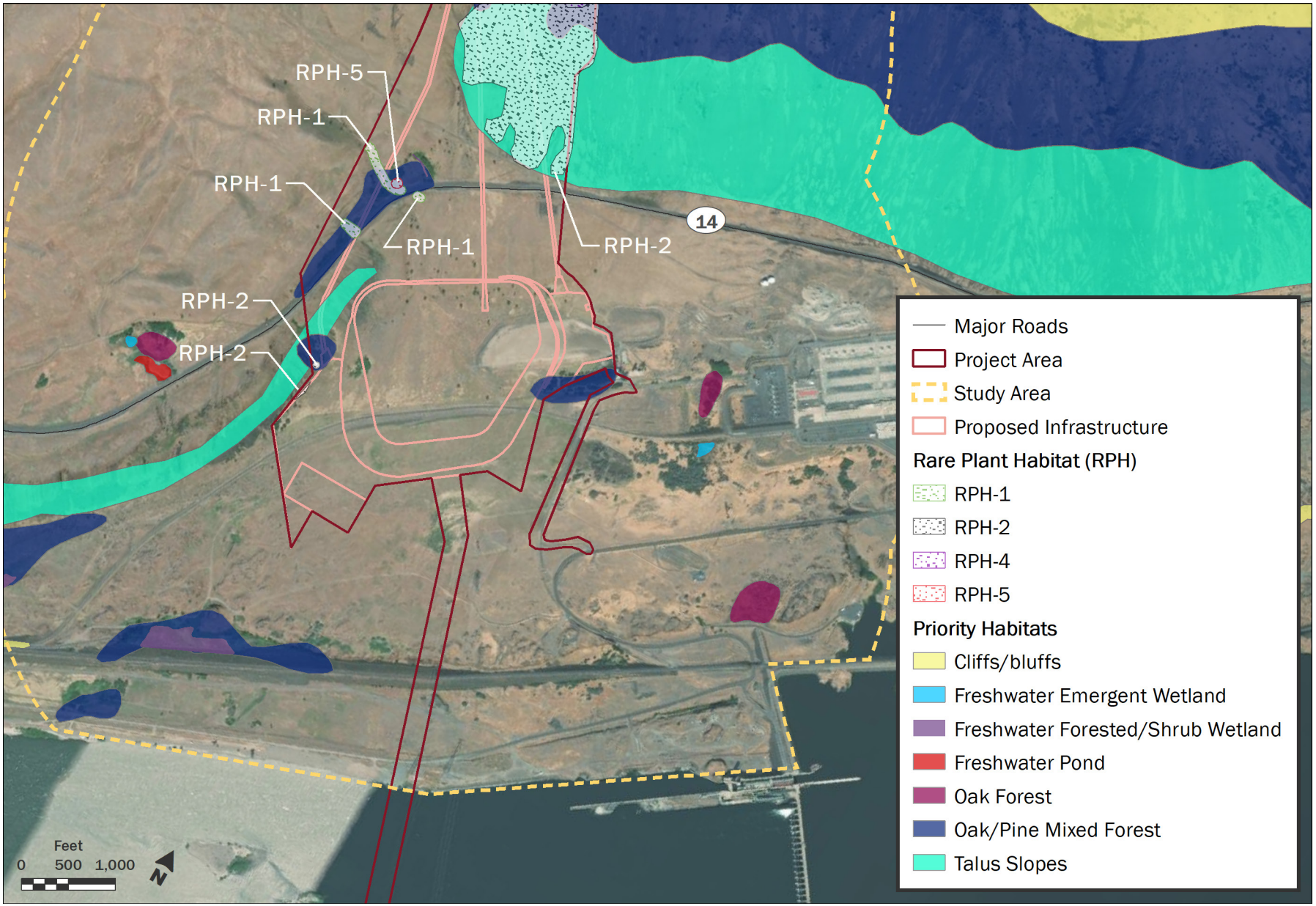
1. Priority habitat descriptions are from WDFW (2008) unless otherwise referenced.
2. Presence of priority habitat and features are documented in the Applicant's Environmental Report, Exhibit E of their FERC FLA (FFP 2020a) and botanical survey in the project footprint (FFP 2020f).
3. Wetland areas are described in more detail in the *Wetlands and Regulated Waters Resource Analysis Report* (Appendix C).

Figure 4.7 1a
Terrestrial Species and Habitats Study Area and Priority and Rare Plant Habitats in the Northern Portion of the Study Area



Data Sources: FFP 2021b; WDFW 2021a.
Note: Unmapped habitat classification areas are shown in Attachment 1 of the *Terrestrial Species and Habitat Resource Analysis Report* in Appendix G.

Figure 4.7 1b
Terrestrial Species and Habitats Study Area and Priority and Rare Plant Habitats in the Southern Portion of the Study Area



Data Sources: FFP 2021b; WDFW 2021a.
Note: Unmapped habitat classification areas are shown in Attachment 1 of the *Terrestrial Species and Habitat Resource Analysis Report* in Appendix G.

Terrestrial Species

The following bullets describe the terrestrial plant, bird, waterfowl, mammal, reptile, and invertebrate species that are either known to occur or could occur in the study area. Sub-bullets provide additional information for key special status species. Additional details and lists of all the terrestrial plant and wildlife species that occur or have the potential to occur within the study area are provided in the *Terrestrial Species and Habitat Resource Analysis Report* (Appendix G) and its attachments.

- **Plants**. Vegetation in the study area is generally characteristic of shrub-steppe and disturbed shrub-steppe habitat with smaller areas of mixed pine forest and scrub-shrub wetland. The central part of the study area is characterized by sparsely vegetated rocky cliff and talus features. Vegetation in the lower central part of the study area is dominated by introduced invasive plant species, many of which are included on Klickitat County's noxious weed list. Such species include Canada thistle, a Klickitat County Class C noxious weed; and dalmatian toadflax, rush skeletonweed, Russian olive, Himalayan blackberry, and quackgrass, which are Klickitat County Class B noxious weeds.

  Noxious Weeds are state-designated invasive, non-native plants that threaten agricultural crops, local ecosystems, or fish and wildlife habitats (WNWCB 2021).

  Seep and ephemeral stream areas in the upper reservoir area and near SR 14 contain an abundance of sagebrush. Seasonal moisture, well-drained soil, and presence of a preferred sagebrush host plant make conditions appropriate for state endangered California (Gray's) broomrape, although none was documented during surveys. The presence of state sensitive Nuttall's quillwort was also not confirmed, though it may be present.

  Along the clifftop, near the southern boundary of the proposed upper reservoir, plant species are primarily big sagebrush and buckwheat species, interspersed with forbs such as arrow-leaf balsamroot, phlox lupine, and desert parsley. Herb-Robert, a Klickitat County Class B noxious weed, was also noted. Habitat in that location is suitable for special status plant species smooth desert parsley, Douglas' draba, and hot-rock penstemon. None of these species have been documented in this location (FFP 2020f). However, smooth desert parsley was found directly west of the lower reservoir and laydown area outside of the project area boundary but inside the study area.

  - ***Smooth Desert Parsley.*** Smooth desert parsley is a perennial herb of the carrot family. Preferred habitat for this species is found in the study area and includes ledges and crevices of basalt cliffs along the Columbia River and nearby rocky slopes of sagebrush steppe. Smooth desert parsley is adapted to dry, rocky conditions where competition is minimal (WNHP 2021). Smooth desert parsley is a state threatened species (WDNR 2021g) and is an important Tribal cultural resource (Shellenberger et al. 2019). It was not documented inside the project boundary during botanical surveys conducted for the Applicant in 2019 (FFP 2020f) but was documented during cultural resource surveys led by the Confederated Tribes and Bands of the Yakama Nation (Yakama Nation) Cultural Resource Program that same year (Shellenberger et al. 2019). Therefore, this plant is considered to be present in the study area. Smooth desert parsley and other culturally important plants are further discussed in the *Tribal Resources Analysis Report* (Appendix H; Ecology et al. 2022).
  - ***Rare Plants.*** Plant habitats are described in more depth in the previous section, including RPHs that are capable of supporting listed endangered, threatened, and sensitive plant species (FFP 2020f). Examples of rare plants that could occur in the RPHs include the following:

- State endangered species:
  - California broomrape
  - Hot-rock penstemon
- State sensitive species:
  - Smooth goldfields
  - Nuttall's quillwort
  - Suksdorf's desert parsley
  - Douglas' draba
  - Few-flowered collinsia
  - Common bluecup
  - Western ladies' tresses
- State threatened species:
  - Smooth desert parsley

- **Birds.** Birds that have been observed in the study area include passerines, corvids, raptors, upland game birds, and waterfowl. Observed bird species include, but are not limited to, American robin, European starling, horned lark, western meadowlark, dark-eyed junco, white-crowned sparrow, common raven, mallard, and American wigeon. Observed raptors include red-tailed hawk, American kestrel, state candidate golden eagle, peregrine and prairie falcons, northern harrier, and state endangered ferruginous hawk. Bald eagles, which are protected under special legislation, were also observed in the study area.

  Cliff and talus rocky and shrubland areas of the study area provide nesting habitat for raptor species. Cliff top shrub-steppe areas and previously developed areas with low-growing vegetation near the lower reservoir provide hunting habitat for predatory species. Raptors may forage as far as 15 miles away from nest sites throughout the reproductive cycle. Raptor use of an area may be substantial if the area contains high prey density, usually in the form of ground squirrels, pocket gophers, and rabbits (WEST 2006). The nearby Columbia River is hunting habitat for raptors that have a preference for hunting over water, such as bald eagles and osprey.

  The two existing stock ponds (Pond/Wetlands P1 and P2) are the only still-water habitat located in the project area that may be used by waterfowl in fall through spring when ponded water is present. Other existing ephemeral or intermittent surface waters and wetlands within the project area lack ponded water and are not likely to provide suitable habitat to waterfowl for extended periods of time. The Columbia River, adjacent to the project area, provides feeding and staging areas for multiple waterfowl species. A Priority Habitat and Species waterfowl concentration area also exists in a side channel of the Columbia River just upstream of John Day Dam. A complete list of waterfowl species that have been observed near the project area, or are likely to occur based on known species distributions, is provided in Attachment 2, Table 2-2, of the *Terrestrial Species and Habitats Resource Analysis Report* (Appendix G).

  - ***Birds of Conservation Concern.*** USFWS identifies several migratory birds as Birds of Conservation Concern in Klickitat County. These are species that, without additional conservation actions, are likely to become candidates for federal listing (USFWS 2008). Birds of Conservation Concern observed near the study area include Cassin's finch, Lewis's woodpecker, rufous hummingbird, long-eared owl, and sage thrasher.
  - ***Golden and Bald Eagles.*** Bald eagles are protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. Golden eagles are a candidate for state listing (Watson et al. 2020). Both eagle species range over large geographic areas and may use different habitats based on breeding, migration, and wintering; availability of prey; and

level of disturbance (Buehler 2020). Human activities can disturb eagles, and spatial buffer zones of 650 feet to 1 mile between eagles and human activities are typically suggested to prevent disturbance (Richardson and Miller 1997).

Bald eagles are typically found near waterbodies including lake shorelines, rivers, and coastal areas (USFWS 2016). Nesting season typically extends between March and August, and they generally nest in mature trees or snags in forested areas near waterbodies that offer foraging opportunities (Buehler 2000). Though rarer, they will nest on cliffs, in shrubs, and on the ground where trees are not available. With increasing frequency, they will also nest on human-made structures, such as power poles and communications towers. Bald eagles were observed near and within the study area during studies conducted for nearby wind farms from 1994 to 2003 but were only present during winter and spring (December to May) and are therefore thought to be migrants (WEST 2006). During subsequent surveys, no nesting bald eagles were observed, although appropriate nesting habitat was documented (WEST 2006). Therefore, nesting bald eagles have the potential to be present in the study area.

Golden eagles typically occupy more mountainous terrain and open, arid environments consistent with that found in the study area. They generally breed in open or semi-open areas in tundra, shrubland, grassland, and desert rimrock, but generally avoid urban and heavily forested areas (Kochert et al. 2002). Golden eagles usually nest on rock ledges and cliffs, but they also nest in large trees, steep hillsides, and—rarely—on the ground (Kochert et al. 2002). USFWS (Pagel et al. 2010) notes that extended construction activities occurring within 1 to 3 miles may disturb golden eagles. When migrating, golden eagles are associated with features such as cliff lines, ridges, and escarpments, where they take advantage of uplift from deflected winds. They often forage over open landscapes, using thermals to move efficiently. Washington breeding golden eagles are non-migratory and nest sites are typically used year after year, with a breeding pair maintaining an average of 2.7 nests in the territory (Watson et al. 2014a, 2014b). During bird surveys conducted from 1994 to 2003, golden eagles were observed in the study area during all seasons (WEST 2006) and golden eagle nests are documented within a 36-square-mile area overlapping the proposed project (FFP 2020a).

- ***Ferruginous Hawk.*** A state endangered species, ferruginous hawks are migratory and occur in arid grasslands and shrub-steppe habitats (WDFW 2021b; Watson et al. 2018). Preferred prey species are burrowing mammals including ground squirrels and pocket gophers, smaller birds, reptiles, and insects, all of which are common in study area. Ferruginous hawks arrive on breeding areas from late April through July. Preferred nesting sites are available in the study area and include small rock outcrops on the slope of steep hillsides or canyons or in isolated trees, such as junipers. This species was observed in and near the study area in low numbers during baseline bird surveys from 1995 to 2002. WDFW has not documented nesting sites within the study area (WDFW 2021a).
- ***Prairie Falcon.*** Prairie falcon is a state priority species because Washington has a limited number of suitable cliffs for nesting (Larsen et al. 2004). Prairie falcons are also migratory birds and subject to the Migratory Bird Treaty Act.

  Prairie falcons prefer the arid environments of eastern Washington, such as shrub-steppe habitat that occurs near and within the study area. Preferred prey includes a variety of species that are common in the study area such as ground squirrels and ground nesting birds and passerines. Prairie falcons require cliffs for nesting but will make use of a wide variety of features from 400-foot basalt cliffs to smaller escarpments raised 20 feet above sloping canyon walls. A study in Oregon found that most suitable scrapes, or nest sites, are located

more than 0.5 mile from human habitation and within 0.25 mile of water (Larsen et al. 2004). Additionally, prairie falcon scrapes and foraging areas are located within home ranges as large as 150 square miles. Suggested spatial buffer zones for prairie falcons range from 164 feet to prevent post-fledging visual disturbance to 0.5 mile for noise disturbance (Richardson and Miller 1997).

WDFW identified prairie falcons and nest scrapes both within and in the vicinity of the study area (WDFW 2021c). In addition, at least two historic prairie falcon scrapes have been documented to the southeast and northeast of the proposed project. In 2019, WDFW surveys documented two adult prairie falcons displaying courtship behavior and confirmed a used scrape (territory; Nest No. 288; WDFW 2021c).

- *Peregrine Falcon.* Peregrine falcons occur in nearly all parts of the state including along the northern outer coast and San Juan Islands, in the Cascade Range foothills, along the Columbia River, adjacent to other waterbodies within the Columbia Basin, and across many parts of eastern Washington (Vekasy and Hayes 2016; WDFW 2021d). Following significant population declines related to the widespread use of DDT in the 1940s and 1950s, peregrine falcons were listed as a federally endangered species by USFWS in 1970 and as a state endangered species by the Washington Fish and Wildlife Commission in 1980 (Vekasy and Hayes 2016; WDFW 2021d).

  Following national restrictions on the use of DDT and species population recovery efforts, peregrine falcon was removed from the federal endangered species in 1999 (Vekasy and Hayes 2016). In 2002, the peregrine falcon was reclassified as a state sensitive species and by 2016, the species' state sensitive status was determined to be no longer applicable under Washington state law (WDFW 2021d). They continue to be classified as "protected wildlife" under WAC 232.12.011 and are protected under the Migratory Bird Treaty Act (Vekasy and Hayes 2016).

  Peregrine falcons typically nest in cliffs near large bodies of water but will also use other relatively high places, including human-built structures (e.g., tall buildings and bridges), that offer protection from potential predators and a vantage point over the surrounding terrain (WDFW 2021d). Peregrines prey on other birds ranging in size from small songbirds to medium-sized shorebirds, gulls, pigeons, and waterfowl. They typically hunt in areas of open cover types including estuaries, agricultural fields, coastal beaches, large bodies of water, and open areas in urban settings. Nesting is largely dependent on the presence and availability of abundant prey in the vicinity of nesting sites and occurs at elevations up to about 3,000 feet or higher in nearly all parts of the state (Vekasy and Hayes 2016; WDFW 2021d). Habitats used by peregrines during the non-breeding season typically support high densities of shorebirds, waterfowl, and other small- to medium-sized birds (Vekasy and Hayes 2016).

  Previous avian surveys in the vicinity of the project area have identified peregrine falcon nests along the Columbia River but note that peregrine falcon breeding occurrence in Klickitat County was rare at the time of the surveys (WEST and NWC 2003; WEST 2006). The Oregon Department of Fish and Wildlife has also reported a peregrine nesting site in the vicinity (FFP 2020a).

- **Mammals.** Many species of small, medium, and large mammals frequently found in shrub-steppe and Columbia Plateau habitats in Washington are likely to occur in the study area. These include shrews, deer mouse, northern pocket gopher, Great Basin pocket mouse, voles, raccoon, weasels, striped skunk, badger, coyote, bobcat, Rocky Mountain mule deer, and Columbian black-tailed mule deer (WEST 2006). Some species are associated with localized habitats near

and within the study area, including porcupine in mixed forest and shrub-steppe areas, yellow-bellied marmot in areas of basalt outcrops and rocky ridges, and Nuttall's cottontail in shrubby thickets and rocky areas (WDFW 2021a; Ecology and Environment 2006). Many small mammals including mouse, voles, gopher, skunk, badger, fox, and ground squirrel use underground dens or burrows during all or part of the year.

The study area is about 5 miles outside of the Mount St. Helen's Elk Herd Management Area (to the west) and about 50 miles outside the Yakima Elk Herd Management Area (to the north). Elk considered part of the Mount St. Helen's Elk Herd are known to pass through the study area and are expected to occur at low densities.

Bats are also known to occur in the study area. Of the 15 bat species that occur in Washington State, 14 are expected to occur in Klickitat County (WDFW 2021e) and 11 were documented in surveys within 11 miles of the proposed project (Fleckenstein 2001 as cited in WEST 2006). Bat species documented near the study area include state candidate species Townsend's big-eared bat. Resident species with a high likelihood of occurring within the study area include big brown bat, pallid bat, California myotis, and western small footed myotis (WEST 2006). Migratory hoary bat and silver-haired bat have also been documented near the study area and are expected to be most common in summer and fall (WDFW 2021e; WEST 2006). Little brown bat, a state priority species (see the sub-bullet below for more information), has also been documented in the study area (WDFW 2021a). The potential for bats to occur in the study area is based on the availability of foraging areas with prey insects, roost trees, and water sources (WDFW 2013). Nearly all bat species found in Washington occasionally roost and hibernate in crevices in rock fractures or talus slopes, which are prevalent in the study area. Mixed forested areas may provide roost trees for some bat species. Small bodies of water such as ponds, streams, and wetland areas in and near the study area may provide water sources and attract foraging bats. The Columbia River and its tributaries are a potential water source for bats, as well as a landscape feature that may serve as a flyway.

- ***Mule Deer.*** Rocky Mountain mule deer, a species of management priority in Washington State, have been documented near the study area (WEST 2006). Mule deer are not a state or federally listed species or a species of concern but are considered to be of cultural and economic importance as this species provides hunting and viewing opportunities, economic support to the state and to local communities, and has long provided food and clothing for native peoples (WDFW 2016).

  The study area is within WDFW's East Columbia Gorge Mule Deer Management Zone. The study area is considered year-round mule deer habitat (WDFW 2016) with a winter concentration habitat area northeast of the study area in central Klickitat County. Mule deer are common throughout much of eastern Washington State and are expected to occur commonly in the study area. Mule deer make seasonal migrations of up to 50 miles and, though adaptable, are negatively impacted by landscape habitat loss, conversion, and fragmentation.

- ***Gray Wolf.*** The federally listed gray wolf (90-day relisting; USFWS 2021c) has the potential to occur throughout Washington State but is unlikely to be present in the study area because no known wolf packs occur within Klickitat County (WDFW 2021f).

- ***Western Gray Squirrel.*** The western gray squirrel is state threatened (WDFW 2021g). WDFW priority species mapping (WDFW 2021a) indicates the potential presence of this species in the study area. However, western gray squirrel presence is unknown because of the lack of recent wildlife surveys in the study area.

Western gray squirrels are most frequently associated with pine trees, which provide nesting cover and seeds for food, and oak trees, which provide natal den sites and acorns for food. In Washington, they also use stands of Douglas fir trees when a component of oak or pine is present. The squirrels require mature stands of trees with sufficient canopy cover to provide secure nest sites and allow for traveling in trees. They also need a diverse selection of vegetation to provide a multitude of food resources. Hollow trees, stumps, and abandoned animal burrows are used as storage sites. Debris such as piping and other abandoned materials are also used. Western gray squirrels mate from early winter to late spring, with one litter of two to four young appearing from March to June (WDFW 2021b). Most squirrels die in their first year but can live up to 3 to 5 years.

There are only three remaining populations of the western gray squirrel in Washington, one of which occupies oak woodlands and conifer forests in Klickitat and Yakima counties, including habitat types similar to those within the study area (WDFW 2021b). The populations are isolated and face threats including habitat loss and degradation, wildfires, highway mortality, and disease. Squirrels experience predation from raptors, coyotes, and bobcats. Vehicles, disease, and starvation also kill squirrels.

- ***Little Brown Bat.*** The little brown bat is a WDFW priority species and is considered one of the most common in Washington State (WDFW 2021e, 2021a). This species makes up approximately 1.3% of bat fatalities at wind farms in the Columbia Plateau Ecoregion (WEST 2010, 2011). Individuals have been captured during bat surveys approximately 11 miles northeast of the study area (Fleckenstein 2001 as cited in WEST 2006), indicating that little brown bat presence in the study area is likely (but unconfirmed).

  This species is a habitat generalist that uses a broad range of ecosystems throughout Washington. In Washington, it occurs most commonly in both conifer and hardwood forests, but also occupies open forests, forest margins, shrub-steppe, clumps of trees in open habitats, sites with cliffs, and urban areas. Within these habitats, riparian areas and sites with open water are usually preferred (WDFW 2021b). Major food sources are emerging aquatic insects (especially midges), but moths, beetles, non-aquatic flies, a variety of other insects, and spiders are also eaten.

  Foraging is often concentrated over or near water, but also occurs in other cover types. Feeding is most active during the 2 to 3 hours after dusk when insect activity often peaks. Mating mostly occurs in late summer and early autumn during swarming before hibernation and may continue into winter, with females giving birth 50 to 60 days later. Day roosting occurs in a variety of sites, including buildings and other structures, tree cavities and beneath bark, rock crevices, caves, and mines. Hibernation generally occurs from September or October until March or April, with hibernation sites including caves, abandoned mines, and lava tubes.

- **Reptiles.** Several species of common reptiles are present in the study area, including Pygmy short-horned lizard, western fence lizard, racer, gopher snake, garter snake, and western rattlesnake (Ecology and Environment 2006). Pygmy short-horned lizards occur primarily in shrub-steppe habitats and have a preference for rocky soils in which they can burrow. Western fence lizards are usually found in association with rock outcroppings, talus slopes, and cliff faces; however, they can also be found in open forested areas on rocks, logs, and trees (Washington Herp Atlas 2009). Garter snakes, western rattlesnakes, racers, and gopher snakes are commonly found throughout Washington State (WDFW 2021h). Reptile winter hibernation and sheltering

areas include rodent burrows, spaces under logs and tree stumps, rock crevices, and lumber and rock piles, all of which occur within the study area.

- **Invertebrates.** No studies of invertebrates have been conducted in the study area. It is assumed that the general soil-dwelling and above-surface invertebrate communities that typically occur in grassland, shrubland, and wooded habitats of the Columbia River Basin occur in the study area. Aboveground invertebrates can be associated with the ground surface or various layers of vegetation from ground cover to tree canopy. Invertebrate groups include insects, mites, spiders, collembola, land snails and slugs, and worm species. Invertebrates provide a food source for other wildlife and perform a variety of functional roles that are important for habitat health including carbon and nutrient cycling, pollination, microclimate control, decomposition, and plant biomass control (Niwa et al. 2001). Both generalist species, those that eat a variety of foods and survive in a variety of habitats, and specialist species, those that require a specific food or habitat, are expected to be present in the study area (Niwa et al. 2001).

4.7.1 How Impacts Were Analyzed

Terrestrial habitat impacts were evaluated to determine if there would be loss of habitat or reduction in habitat function. Direct impacts may be due to changes in habitat quantity and quality. Indirect impacts are those that alter habitat connectivity, prey abundance, interactions with non-native species, or other key functional elements. Impacts on habitats from construction of the proposed project were based on the footprint of the proposed facilities and temporary construction sites and considered the area of each habitat type that would be affected. The impact assessment considered whether changes would cause degradation, loss, or conversion of habitat, including rare or special status habitat, and whether that habitat change could increase risks to species viability. Impacts on habitats from operation considered whether changes would cause ongoing or repeated disturbance of habitat, including rare or special status habitat, and whether that habitat change could increase risks to species viability. In addition to the immediate area of operation, indirect impacts on surrounding habitat within the defined buffer zone for the terrestrial species and habitats study area were also considered.

Terrestrial wildlife and plant species impacts were evaluated to determine if there would be disturbance, injury, or mortality resulting from earthwork, stranding, noise and vibration, or other actions. In addition, this assessment considered indirect impacts on terrestrial species that could be caused by impacts on terrestrial habitat including reduced quantity, quality, or loss of functional elements. The assessment of impacts on terrestrial wildlife and plant species from construction were determined based on potential presence of terrestrial species, including special status species, within the construction area.

The assessment of impacts from project operations considered the potential presence of terrestrial wildlife and plant species within the study area, including seasonal presence. The impact assessments for both construction and operations considered whether changes would cause mortality or permanent injury to a species, events that increase the need for federal or state listing of a species or increase risk to species viability, and disruptions of normal species behavior. More information on how impacts were analyzed is in the *Terrestrial Species and Habitats Resource Analysis Report* (Appendix G).

4.7.2 Findings for the Proposed Project

4.7.2.1 Impacts from Construction

Direct Impacts on Terrestrial Habitat

Terrestrial habitats within the footprint of the upper and lower reservoirs would be permanently lost by construction of the project. Activities that would affect these areas include excavation, fill placement,

grading, and structure installation for construction of the reservoirs, reservoir berm areas, berm access road at the upper reservoir, and the substation area near the lower reservoir. Direct temporary and permanent impacts on terrestrial habitats from construction of the proposed project are summarized in Table 4.7-3 and discussed further after the table.

Table 4.7-3
Permanent and Temporary Direct Impacts on Washington Department of Natural Resources Natural Heritage Program Habitat Types from Construction of the Proposed Project

HABITAT TYPES	TEMPORARY IMPACT[1] (ACRES)	PERMANENT IMPACT[1] (ACRES)
Columbia Plateau Steppe and Grassland	7.5	49.6
Columbia Plateau Scabland Shrubland	0	1.8
Inter-Mountain Basins Cliff and Canyon	0	0.6
Inter-Mountain Basins Big Sagebrush Steppe	8.1	40.8
Columbia Plateau Western Juniper Woodland and Savanna	0.8	0.2
Introduced/Invasive Annual Grassland[2]	37.1	90.4
Introduced/Invasive Wooded	0	0.9
Developed/Disturbed	0.8	9.3
Total	**54.3**	**193.6**

Notes:
1. Temporary impact areas are from Table 3.3-7 of FFP 2020a. Permanent impact areas (except Developed/Disturbed) are from Section 4.2 of the Applicant's response to FERC's request for additional information (Rye Development 2021b).
2. With and without rocky outcroppings.

Permanent impacts on terrestrial habitat types from construction of the upper reservoir include the loss of 49.6 acres of imperiled Columbia Plateau Steppe and Grassland and 40.8 acres of imperiled Inter-Mountain Basins Big Sagebrush Steppe habitats. Small areas of Columbia Plateau Scabland Shrubland (1.8 acres) and Columbia Plateau Western Juniper Woodland and Savannah (0.2 acre) and developed/disturbed area would also be permanently lost by that work. These impacts would encompass the entirety of Applicant-defined RPH-1 (1.8 acres) and a 1.1-acre portion of RPH-3 (Figure 4.7-1a). This would be a permanent loss of imperiled habitats and RPH, but species viability would not be impacted. As such, it would not result in a significant adverse impact.

Most (91.3 acres) of the proposed permanent habitat loss from construction of the lower reservoir would affect introduced/invasive-species-dominated annual grassland and woodland. A small area of developed/disturbed area would also be permanently affected. Because of the lower quality of these habitats, this would not result in a significant adverse impact.

Terrestrial habitats within the project boundary and identified as construction laydown areas would also be temporarily impacted during construction. Habitat types affected by that work would include Columbia Plateau Steppe and Grassland (7.5 acres), Inter-Mountain Basins Big Sagebrush Steppe (8.1 acres), Columbia Plateau Western Juniper Woodland and Savanna (0.8 acre), and introduced/invasive annual grassland (37.1 acres). Columbia Plateau Western Juniper Woodland and Savanna is considered a vulnerable habitat type and could be important for state threatened western gray squirrels in the study area, but the amount of habitat temporarily lost would be small and no oaks were identified in the habitat. Therefore, this would not result in a significant adverse impact. All temporarily disturbed habitat types are expected to be revegetated after construction consistent with the Applicant's draft VMMP (FFP 2020e).

Terrestrial habitats in the cliff areas between the upper and lower reservoirs would be temporarily degraded during construction because of increased noise and vibration from heavy equipment and blasting for surface and underground components of the project (e.g., access tunnels, underground powerhouse, and headrace tunnels). Canyon-shaped areas where noise is reflected would likely shorten the distance at which noise-related disturbance could occur. This disturbance would make the habitat unsuitable for hibernating, nesting, or burrowing species. Because the increased noise and vibration would be temporary, this would not result in a significant adverse impact to habitat.

Construction impacts on special status habitats include both the permanent loss of Priority Habitat and Species mapped Oak/Pine Mixed Forest near the lower reservoir as well as a temporary loss of the same habitat type near the upper reservoir. The loss of these habitat types would not result in a significant adverse impact because the areas are small, no oak is present, and mixed pine forested areas are abundantly available in the study area and surrounding areas.

There would be temporary degradation of John Day Talus and cliff/slope mixed pine forest (Priority Habitat and Species mapped as Oak/Pine Mixed Forest) between the lower and upper reservoirs during construction. The habitat degradation would occur due to noise, vibration, traffic, and dust generated during construction that could reduce the ability of this habitat to support raptor breeding and nesting for multiple years. Although these impacts would be temporary, they would be considered significant impacts. However, with implementation of the Applicant's proposed mitigation measures (see Section 4.7.2.3), these would not be considered significant and unavoidable adverse impacts.

Direct Impacts on Terrestrial Species

Direct construction impacts on terrestrial plants, birds, mammals, reptiles, invertebrates, and special status species are described as follows:

- **Plants.** Construction of the proposed project would result in the direct mortality of plant species in the upper and lower reservoir construction areas, including the permanent loss of about 81.5 acres of trees, shrubs, and herbaceous plant species. About 9.6 acres of permanently lost plant species occur in RPH, which includes potential habitat for multiple rare plants including California broomrape, smooth desert parsley, Douglas' draba, and hot-rock penstemon. Approximately 53.5 acres of plant species would be temporarily lost including about 5.2 acres in RPH. Plant species would also be directly affected by compaction of topsoil and permanent disturbance of seed banks during the construction of laydown areas. After construction, temporarily disturbed areas and directly adjacent areas would be more prone to establishment by invasive plant species. Overall, the direct mortality of plant species and disturbance of habitat would not increase risk to species viability and therefore would not result in a significant adverse impact on plants.
- **Birds.** Breeding and pre-fledged birds are more likely to be directly affected by vegetation clearing and other construction activities, which could result in elimination of nesting and perching sites. Cliff-nesting raptors, especially those with hatchlings or fledglings, within or near the study area could experience impacts from repeated disturbance from construction activities or reduced prey availability during construction. Disturbance can cause eagles to exhibit agitation and vigilant behavior, change their foraging and feeding, and abandon nests (Pagel et al. 2010). The degree of sensitivity to disturbance may depend on habitat characteristics, stage of breeding cycle, the type of disturbance, and the individual bird (Richardson and Miller 1997; Pagel et al. 2010). This would not result in a significant adverse impact because it would not increase the risk to species viability for non-special status species. Special status bird species are discussed below.

Waterfowl are not likely to be directly affected by construction activities due to their ability to fly away from the disturbance areas. Impacts on waterfowl would include disturbance and relocation to different habitats. No breeding areas or areas of high concentration of waterfowl are expected to occur within the area of construction. Because the impact would be a short-duration disruption of normal behavior and would not affect sensitive life stages such as breeding or overwintering, construction of the proposed project is not expected to result in a significant adverse impact on waterfowl.

Non-nesting, post-fledged, and adult birds are the least likely to be directly affected by construction activities due to their ability to fly away from the disturbance areas. Impacts on these birds would include disturbance and relocation to different habitats. These impacts would occur throughout the 5-year construction period but would cease once construction is completed. Because the impact would be a temporary disruption of normal behavior, this would not result in a significant adverse impact.

- **Mammals.** Mammals such as gophers, moles, voles, shrews, and mice may experience a higher degree of effects from construction activities because they have a smaller range and depend more on ground burrowing. These animals may experience direct harassment, injury, or mortality resulting from construction equipment use, ground compacting activities, and blasting. If they are forced to leave established burrows and dens in winter, small mammal species would be exposed to harsher conditions and may not be able access cached food resources. Disruption and/or direct mortality of hibernating small mammals could also occur. Overall, short-term to persistent disruptions in behavior and injury or mortality to non-special status species would not result in significant adverse impacts to non-special status mammals during construction. Special status mammal species are discussed below.

  Larger mammals (e.g., deer, bobcat, coyote, and fox) are the least likely to be directly affected by construction activities due their ability to move quickly and travel sufficient distances from the disturbance.

- **Reptiles.** Reptiles such as snakes and lizards may be killed or injured during construction. Construction activities that could disrupt or destroy reptile habitats include excavation, berm building, vegetation clearing, vehicle operation, and blasting. Disruption and/or direct mortality of hibernating reptiles could also occur. This would not result in a significant adverse impact on non-special status reptiles because of the abundance of suitable reptile habitat in the surrounding areas. No special status reptile species are known to occur in the study area.

- **Invertebrates.** Invertebrates may be injured or killed during construction activities. Non-winged invertebrates are more susceptible to direct impacts due to their limited mobility and relatively small home ranges. Winged invertebrates are likely to relocate to adjacent unaffected habitats. Invertebrates are expected to experience negligible impacts because they are common in habitats similar to the study area.

Direct Impacts on Special Status Species

A number of WDNR Heritage Plant species, including culturally important smooth desert parsley, could be adversely affected by construction activities. Because the area lost is relatively small and other documented areas of smooth desert parsley are located nearby, this would not result in a significant adverse impact to the species. However, the loss of desert parsley and other culturally important plants could be a significant impact to Tribal resources as described in the *Tribal Resources Analysis Report* (Appendix H).

If present, actively breeding and nesting golden eagles at previously documented cliff sites directly adjacent to the lower reservoir area could be disturbed by heavy equipment operation and drilling and blasting noise and vibration, which could affect species viability. Additionally, extended construction activities occurring within 1 to 3 miles may cause golden eagle disturbance, including nest abandonment, which would constitute "take" under the Bald and Golden Eagle Act. Although this could be a significant impact, implementation of proposed mitigation measures (see Section 4.7.2.3) would reduce or eliminate impacts on breeding and nesting golden eagles.

Although construction impacts on state priority species would be considered significant, disruptions to normal behavior would be temporary and the Applicant has proposed mitigation measures (see Section 4.7.2.3). Considering the temporary impact and implementation of mitigation, there would be no significant and unavoidable adverse impacts to state priority prairie falcons, state threatened western gray squirrel, bald eagles, and state endangered ferruginous hawk.

Indirect Impacts on Terrestrial Habitat

Construction would result in permanent reduction in habitat connectivity between aquatic and riparian habitat of the Columbia River and upland plateau and cliff habitats in the study area. Lateral connectivity along plateau and cliff habitat would also be decreased. Reduction in habitat connectivity would affect all habitat types, including special status habitats. The presence of new physical obstructions and increased human activity from construction and traffic would reduce habitat connectivity by making it more difficult for some wildlife species to make daily and seasonal movements, but the changes would not increase risk to species viability. Therefore, impacts would not be significant.

Indirect Impacts on Terrestrial Species

No indirect impacts to terrestrial species are expected to result from construction.

4.7.2.2 Impacts from Operation

Direct Impacts on Terrestrial Habitats

No direct impacts on terrestrial habitats are expected during operation of the proposed project.

Direct Impacts on Terrestrial Species

Periodic vegetation management could result in direct impacts from injury or killing of individual invertebrates. Similar to construction, non-winged invertebrates are more susceptible to direct impacts due to their limited mobility and relatively small home ranges. Winged invertebrates are likely to relocate to adjacent unaffected habitats. Invertebrates are expected to experience negligible impacts because they are common in habitats similar to the study area. No additional direct impacts on terrestrial species are expected during operation of the project.

Indirect Impacts on Terrestrial Habitat

Within the study area outside the proposed project boundary, there would be indirect impacts from reduced habitat function including a long-term reduction in the ability of the study area to support the same abundance and community of species that it previously supported. These indirect impacts on terrestrial habitat would not result in a significant adverse impact because ongoing or repeated disturbance of habitat that is critical to species viability would not occur.

The reservoir open water areas are not intended to provide habitat, but would likely attract birds, bats, and flying insects, potentially resulting in injury or mortality from wind turbines near the upper reservoir. In addition to flying insects, wind-dispersing invertebrates could get caught on fencing and lighting infrastructure. Insects and spiders would provide a food source to birds and bats, potentially attracting them to the area.

The open water areas created by the reservoirs could also attract ground-dwelling species, including small prey species and elk and deer, to a potential water source. The Applicant's draft WMP includes wildlife deterrents for the reservoirs such as fences around the edges of the reservoirs that would likely deter larger mammals. Floating shade balls in the reservoir open water areas are also proposed as a mitigation measure by the Applicant to help deter birds, but no information is given in the Applicant's WMP on how bats would be deterred (FFP 2020c). Because the unintentional creation of habitat by the proposed project would not result in ongoing or repeated disturbance of habitat that is critical to species viability, these types of indirect impacts would not be considered significant adverse impacts.

Changes to air habitat in the study area could happen because of changes in topography, moisture, and temperature caused by the proposed project, including construction of the reservoirs. These changes to air habitat have the potential to cause indirect adverse effects on flying species, especially soaring raptors, that rely on consistent air habitat characteristics and function. A wind resource effects analysis conducted by the Applicant (ERM 2021a) explains how raptors that currently occupy the study area are not expected to have difficulty navigating in the changed air habitat conditions above the upper reservoir. Therefore, there would be no significant adverse impacts on air habitat.

The increased human activity in the study area with proposed project operations would decrease habitat quality for some species. Operation and maintenance of the proposed facility would produce periodic noise and vibration, primarily from the turbine-generator system and maintenance activities. Impacts from noise and vibration during operation would be substantially lower than construction noise and vibration impacts because there would be much less activity. The Applicant expects that background noise levels will not be elevated beyond 500 feet from project infrastructure (FFP 2020a).

The Applicant indicates they will minimize noise impacts to protect the rural setting that currently exists in the Columbia Gorge. Operational noise from the proposed project is expected to be negligible. It is likely that an alarm system will be used to alert bystanders to the start of pumping from one reservoir to the other. This will create a short-term local noise but will be an important safety feature and should not be mitigated (FFP 2020a). There is a potential for significant indirect adverse impacts on talus and cliff habitat if they can no longer support breeding raptors because of the proximity of human development and reduced prey availability. Such impacts could result in ongoing or repeated disturbance of habitat that is critical to species viability. The impact level would be dependent on the current presence of breeding raptors in this habitat determined during wildlife surveys.

Artificial lighting installed for proposed project operations may further reduce habitat connectivity by creating light barriers for some nocturnal species (Lacoeuilhe et al. 2014). Because the steep bluff between the two reservoirs would have little to no surface disturbance and there is a relative abundance of undisturbed habitat in the vicinity of the proposed project, these types of indirect impacts would not result in ongoing or repeated disturbance of habitat that is critical to species viability. As a result, they would not be considered significant adverse impacts.

As previously discussed, John Day Talus and Cliffs habitats in the study area may no longer support nesting raptors because of the permanent proximity of human development and reduced prey availability, which could be a significant adverse impact. Wildlife studies (proposed by the Applicant as part of the mitigation measures) would identify areas that are currently used for roosting, nesting, or foraging by culturally important or special status raptor species such as golden eagles, ferruginous hawks, and prairie falcons. However, with mitigation (Rye Development 2021b), the impact to prey raptor habitat is not expected to be significant.

Indirect Impacts on Terrestrial Species

- **Plants**. Increased disturbance associated with operation of the proposed project (e.g., dust and vehicle traffic) could increase the opportunity for invasive plant species to become established and spread in the study area. An increased abundance of invasive species would also increase seed dispersal to surrounding habitats where invasive species could out-compete native plant species. The Applicant plans to implement a Noxious Weed Management Plan, as described in their draft VMMP (FFP 2020e), to reduce the potential for these indirect impacts. Therefore, this would not result in a significant adverse impact.

- **Mammals and Birds.** Mammals and birds may be affected by loss, conversion, degradation, and fragmentation of habitats throughout the study area. Following construction, mammals and birds may continue to adapt to the changing habitat conditions or move into adjacent habitats in the project operational time frame.

  Small mammals may be more greatly affected by the scale of habitat fragmentation, loss of travel corridors, or conversion, removal, or disturbance of habitat types in the study area. Over time, small populations that become isolated could die off. This could result in a minimal indirect impact on regionally common species of small mammals such as shrews, deer mouse, northern pocket gopher, Great Basin pocket mouse, and various species of voles.

  Operation of the project could permanently reduce the density of small prey species in the study area, thereby affecting raptor species such as prairie falcons and golden eagles. Over time, the combined effect of increased ongoing disturbance and reduced prey resources could cause permanent disruptions of normal behavior for golden eagles. Such disruptions could cause increased risk to overall species viability. Therefore, these types of indirect effects would result in a significant adverse impact. However, the Applicant has agreed to purchase and protect raptor foraging habitat to compensate for these indirect impacts. With mitigation, the impact to prey resources and foraging habitat is not expected to result in a significant adverse impact to golden eagles and other raptors.

  Birds and bats that congregate around the open water areas of the reservoirs because of increased insect prey resources would be more likely to experience a collision with existing project power lines or nearby wind turbines. Floating shade balls in the reservoir open water areas are proposed as a mitigation measure by the Applicant to help further deter birds. No state or federally endangered or threatened species are expected to be among those that would congregate near the reservoirs. Therefore, this would not result in a significant adverse impact.

  Light pollution can have negative effects on migration, nighttime navigation, breeding behavior, and reproduction of songbirds (Kempenaers et al. 2010). Artificial light can reduce foraging ability for some bat species, especially those that tend to be more sensitive to habitat disturbance (Lacoeuilhe et al. 2014). Because most flying species would be able to avoid the study area, there would be no significant adverse impacts. Such indirect impacts may also be further reduced by implementation of the Applicant's proposed lighting design.

- **Reptiles.** Reptiles that occur in the study area may continue to adapt to the changed habitat conditions of the proposed project operations or move into adjacent unimpacted habitats. Therefore, there would be no significant adverse indirect impacts from operation of the proposed project on reptiles. No special status reptile species are documented to be present.

- **Invertebrates.** Invertebrates would be subject to the same operational effects as other animal groups, including loss, conversion, degradation, and fragmentation of habitats throughout the study area. In addition to direct impacts from injury or killing of individual invertebrates during

periodic vegetation management and removal, such actions could also indirectly affect invertebrates by reducing potential habitat. Overall, there would be no significant adverse indirect impacts on invertebrates from operation of the proposed project.

Indirect Impacts on Special Status Species

Disturbance from project operations could increase establishment and seed dispersal of invasive plants, which could then out-compete native and rare plant species. This indirect impact could affect culturally important smooth desert parsley and other rare plant species with the potential to be present in the study area. State candidate golden eagles could experience indirect impacts ranging from permanent disruptions to normal behavior. Other special status raptors such as state sensitive bald eagle and state threatened endangered ferruginous hawk are not known to breed in the study area. State priority species little brown bat could experience increased mortality at nearby wind turbines if it is attracted to increased prey resources at the reservoir open water areas. If present, state threatened western gray squirrel could experience significant adverse impacts. However, with the implementation of the Applicant's proposed mitigation measures (see Section 4.7.2.3), there would be no significant adverse impacts on special status species from operation of the proposed project.

4.7.2.3 Proposed Mitigation Measures

Permit-Required Mitigation Measures

An Eagle Incidental Take Permit may be required if disturbance to golden eagles cannot be avoided and if impacts are determined to constitute "take" under the Bald and Golden Eagle Act. Mitigation measures may be recommended by USFWS during review of an Incidental Take Permit, and compensatory mitigation may be required to ensure the preservation of the affected species. Required mitigation may include measures that lead to an equal or greater increase in the species population.

Applicant-Proposed Mitigation Measures

The Applicant proposed several mitigation measures to reduce impacts on terrestrial species and habitats in their draft VMMP (FFP 2020e) and draft WMP (FFP 2020c). Drafts of the VMPP and WMP were developed in coordination with USFWS, WDFW, and Oregon Department of Fish and Wildlife and are being revised in coordination with those agencies. Once finalized, those plans will be included as articles of the FERC license and will be enforced with other license requirements. Copies of the draft plans are provided in Attachments 4 and 5 of the *Terrestrial Species and Habitats Resource Analysis Report* (Appendix G). The mitigation measures proposed in the draft VMMP and WMP and the intent of those measures are summarized in Tables 4.7-4 and 4.7-5. Applicant-proposed mitigation is generally intended to be specific to the impact addressed and includes measures to avoid, minimize, rectify, reduce, or compensate for lost resources and functions.

Proposed revisions to the measures in the draft VMMP and WMP for terrestrial species and habitats are also provided in a section after Tables 4.7-4 and 4.7-5, and Section 4.6.2.3 provides expected revisions to the WMP for aquatic species and habitats.

Table 4.7-4
Summary of Proposed Mitigation Measures in the Applicant's Draft Vegetation Management and Monitoring Plan

PROJECT PHASE	PROPOSED MITIGATION MEASURE	BRIEF DESCRIPTION	MITIGATION INTENT
Pre-construction	Noxious Weed Survey and Invasive Plant Control Plan	• Conduct a pre-construction invasive plant survey to establish baseline conditions for noxious weed and invasive plants in the project area • Develop a list of target species to be surveyed and mapped in the project area • Develop a comprehensive noxious weed/invasive plant control plan that includes the identification of control methods and revegetation practices	• Reduce the spread of noxious weeds and invasive species both within and adjacent to the project area
Construction	Noxious Weed Management	• Provide training to increase worker awareness and identification of noxious weed/invasive plants, procedures for reporting and confirming infestations, and prevention/control measures • Treat existing noxious weed/invasive plant infestations prior to performing construction and maintenance activities • Clean machinery and equipment to remove potential noxious weed/invasive plant seeds, especially when transferring equipment between the upper and lower portions of the study area • Minimize disturbance of existing native vegetation and avoiding disturbance of vegetation in sensitive areas • Reseed disturbed areas with native plant seed mix developed in coordination with WDFW • Use certified weed-free hay, straw, and topsoil for construction activities where possible	• Reduce the spread of noxious weeds and invasive species both within and adjacent to the project area
	Protection of Native Vegetation	• Control noxious weeds and invasive plants using the BMPs identified in the Noxious Weed/Invasive Plant Control Plan • Flag or fence areas containing sensitive plants • Designate specific areas for work activities, access, and equipment movement	• Avoid and minimize disturbance to native and sensitive plant communities
	Revegetation of Temporary Disturbance Areas	• Reseed any vegetated area that is temporarily disturbed by construction activities • Prepare native seed mix appropriate for project area in coordination with WDFW and additional guidance from other agencies (e.g., U.S. Bureau of Land Management)	• Restore areas of soil disturbance with native vegetation to prevent/reduce erosion and to reduce/prevent recolonization by noxious weeds or invasive species

PROJECT PHASE	PROPOSED MITIGATION MEASURE	BRIEF DESCRIPTION	MITIGATION INTENT
Operation	Noxious Weed Management	• Manage noxious weeds per the Noxious Weed/Invasive Plant Control Plan • Monitor revegetated areas for compliance with performance standards • Replant and/or amend areas where vegetation is not meeting performance standards • Avoid new areas of vegetation disturbance	• Reduce the spread of noxious weeds and invasive species both within and adjacent to the project area
	Grazing Control for New Plantings	• Install protective enclosures (e.g., wire cages, rigid protection tubes) on planted trees and shrubs to prevent/reduce grazing damage from wildlife such as deer, antelope, and elk	• Ensure viability of native woody plantings to support the reestablishment of wildlife habitat
	Restored Area Monitoring	• Perform a minimum of 5 years of annual monitoring of restoration plantings for compliance with performance standards • Maintain planted areas to control noxious weeds/invasive species and grazing control measures • Consult with agency stakeholders and landowners on revegetation program • Establish reference plots in adjacent native habitats that will not be disturbed by the project to provide a reference for comparing revegetation success • Monitor any areas where reseeding occurs for germination and establishment success • Document area of erosion • Monitoring noxious weed/invasive species and identify appropriate treatment methods	• Restore disturbed areas to provide native vegetation that supports terrestrial habitat and species including special status species

Source: FFP 2020e

Table 4.7-5
Summary of Proposed Mitigation Measures in the Applicant's Draft Wildlife Management Plan

PROJECT PHASE	PROPOSED MITIGATION MEASURE	DESCRIPTION	MITIGATION INTENT
Pre-construction	Raptor Nest Surveys and Monitoring	• Conduct pre-construction surveys to identify and locate raptor (bald eagle, golden eagle, and prairie falcon) nests based on historically documented nest locations and all areas of suitable nesting habitat within 1-mile of the project area • Focus golden eagle and prairie falcon surveys on historically documented nest locations near the project area • Perform occupancy surveys for identified nests for two consecutive breeding seasons prior to initiating construction with a third survey performed during the summer to evaluate nest productivity • Develop mitigation measures and nest protection measures in coordination with USFWS, WDFW, and Oregon Department of Fish and Wildlife	• Provide essential information for avoiding and reducing disturbance and other forms of take of raptors including golden eagle, prairie falcon, and bald eagle • Inform mitigation decisions
	Bald Eagle Winter Roost Surveys	• Conduct pre-construction winter roost surveys in all suitable roosting habitat in the study area between December and February to identify and document bald eagle communal winter roost sites	• Inform the development of measures to avoid or minimize construction and operations impacts on bald eagle winter roost sites
	Literature Review	• Conduct a literature review to collect information on migratory bird and bat impacts from the operation of pumped storage projects adjacent to wind turbines	• Inform the development of measures to reduce the attractiveness of the future reservoirs to migratory birds and bats
Construction	Flagging/Fencing Construction Zone Limits	• Placement of flagging and/or fencing around the limits of the construction zone and boundaries of adjacent sensitive areas	• Alert workers to the presence of potential sensitive areas in the vicinity of the project area • Reduce the potential for construction disturbance of sensitive areas (e.g., high quality native plant communities, priority habitats) designated for preservation
	Construction Activity Work Window	• Limit construction activities to the hours between 8:00 a.m. and 6:00 p.m.	• Avoid disrupting crepuscular foraging activity by species such as ungulates and raptors (e.g., owls) and minimize disturbance of nocturnal wildlife activity

PROJECT PHASE	PROPOSED MITIGATION MEASURE	DESCRIPTION	MITIGATION INTENT
Construction	Noise Control	• Limit construction during nesting and breeding periods, and concentrate construction activities with the loudest noise potential to occur outside of critical nesting periods • Prohibit on- and near-surface blasting and helicopter use within 0.25 to 1 mile of active nest sites (when feasible) • Avoid blasting within 0.5 mile of active golden eagle nests • Refine spatial noise control buffer using site-specific studies and consultation with a knowledgeable area biologist • Conduct high noise activities simultaneously when feasible • Equip noise-producing equipment with mufflers or other types of noise control features when possible	• Reduce disturbance on nesting raptors and other wildlife in the vicinity of the project area
	Raptor-Safe Transmission Line Construction Methods	• Implement standards and guidelines from Avian Power Line Interaction Committee and the Electrocution Mitigation Basics protection, mitigation, and enhancement measures during construction of power transmission lines • Install visibility enhancement devices (e.g., marker balls, bird diverters) on transmission line wires • Ensure transmission lines are sited on existing poles to maintain appropriate clearance between energized conductors and grounded hardware	• Minimize risk of electrocution and collision mortality to raptors that contact the project's power transmission lines
	Biological Monitor	• Employ a biological monitor to check construction sites to ensure protected areas are not disturbed and protective measures (e.g., flagging fencing) are intact, inspect open construction pits daily to ensure animal safety, and verify that open pits are closed, temporarily fenced, or covered each evening	• Ensure that construction mitigation measures are being properly implemented and maintained • Identify potential problems with construction mitigation measures so that they can be rectified before impacts on wildlife or sensitive areas occur
	Biological Training Program	• Provide environmental training on sensitive biological resources associated with the project to construction workers, contractors, and future project operations employees	• Develop awareness of the sensitive biological resources in the project area and vicinity so that workers can identify potential impacts on those resources and the means to avoid and/or minimize such impacts

PROJECT PHASE	PROPOSED MITIGATION MEASURE	DESCRIPTION	MITIGATION INTENT
Construction	Habitat Loss Management	• Use existing roads and previously developed lands for majority of project features and construction activities • Purchase an off-site property for compensatory mitigation for wildlife habitat impacts (i.e., golden eagle) at a 2:1 mitigation ratio for habitat impacts in the upper reservoir area and a 1:1 ratio for habitat impacts the lower reservoir area	• Avoid/minimize impacts on on-site habitats • Provide compensatory mitigation for wildlife habitat loss
	Traffic Management Plan	• Set appropriate speed limits for the project area to minimize collisions with wildlife • Control dust and erosion to limit changes in air quality and visibility • Establish controlled/limited construction access routes to reduce potential for collisions • Install appropriate signage and other features (e.g., speed bumps, flaggers) to notify recreation users of construction work and to direct traffic as needed	• Avoid minimize wildlife and individual injuries/fatalities from vehicle activity
Operation	Carcass Removal Program	• Monitor and remove carcasses of livestock, big game, and other animals from the project area	• Reduce presence of scavenging wildlife, foraging eagles, and other raptors in the project site by removing potential attractants
	Wildlife Deterrents for Reservoirs	• Install floating plastic shade balls and wildlife exclusion fencing in and around the reservoirs • Monitor bird usage of the reservoirs • Manage vegetation adjacent to reservoirs • Install fences, riprap, or cement around edges of reservoirs • Implement bird hazing techniques (if necessary) • Install physical barriers (e.g., low-current shocking wires/strips, modified reservoir edge habitat) • Reduce potential forage around reservoirs • Mark fences associated with the project with vinyl strips and/or reflective tape	• Discourage migratory birds and other wildlife from using the reservoirs • Reduce potential attractants to mammals that are potential raptor prey species • Continue to evaluate the effectiveness of bird and wildlife deterrents; implement adaptive management if unsuccessful • Reduce risks of avian collision with project structures
	Wildlife Incident Reporting System	• Develop wildlife incident reporting system that accompanies the USFWS Injury and Mortality Reporting System • Report incidents of wildlife mortality, injuries, nuisance activity, and other interactions • Report eagle injuries or mortalities immediate to USFWS and WDFW	• Identify ongoing project impacts on wildlife • Identify modified or additional project conservation measures to protect wildlife from harm

PROJECT PHASE	PROPOSED MITIGATION MEASURE	DESCRIPTION	MITIGATION INTENT
Operation	Dust Palliatives	• Apply dust palliatives or suppressants to all unpaved roads	• Reduce dust clouds from vehicle use that could disturb wildlife or reduce forage quality in the project vicinity
	Light Pollution Management	• Implement artificial light pollution control measures (e.g., use warm-colored LED lights; install shield to limit glare and illumination area; turn off unnecessary lights at night)	• Reduce attraction of insects to reservoir areas, which may draw bats and nocturnal birds seeking prey • Reduce potential disorienting effects of light on migrating and or nocturnal birds • Reduce potential disturbances to songbird breeding and reproductive behavior
	WMP Reporting	• Submission of annual reports throughout the construction period and during the first 3 years of property operation to document monitor results, implementation and success of mitigation measures, and any proposed changes to the WMP (e.g., additional mitigation measures)	• Reduce impact to avian and other wildlife species by continuing to evaluation wildlife usage of the project area and the effectiveness of the mitigation measures

Source: FFP 2020c

WDFW-Proposed Mitigation Measures

WDFW proposes the following additional mitigation measures to help identify and mitigate for impacts to terrestrial species and habitats. Ecology supports these additional measures, which are expected to be included in revisions to the WMP through ongoing agency coordination:

- **Peregrine Falcon Measures.** WDFW proposes adding peregrine falcons to the list of raptors (which currently includes bald eagle, golden eagle, and prairie falcon) covered by surveys, monitoring, and conservation and mitigation measures in the WMP.
- **Raptor Monitoring During Proposed Project Operations.** Raptor monitoring is not currently included in the WMP for operations (i.e., past the construction period) but is expected to be included in revisions to the WMP through agency coordination. Monitoring during proposed project operations would be used to evaluate the effectiveness of ongoing mitigation measures for the protection of raptors, nests, and foraging habitat. Ongoing monitoring results would continue to inform the development of specific mitigation and protection measures.
- **Focused Raptor Mitigation and Protection.** Raptor monitoring during pre-construction, construction, and operation of the proposed project would be used to inform the development of specific raptor mitigation measures (e.g., spatial and temporal work restrictions based on documented nest locations and sensitive species timing needs) and general nest protection measures in consultation with USFWS, WDFW, and Oregon Department of Fish and Wildlife.
- **Pre-Construction Bat Surveys.** To address the lack of survey information on bats in the project area, pre-construction bat surveys are recommended to identify those bat species present in the study area and how bats are using the study area (e.g., foraging, roosting, hibernacula).
- **Post-Construction Bat Surveys.** Use of year-round acoustic monitoring is recommended to determine if bats are attracted to the reservoirs by nighttime insect activity, water, or other factors, and whether the proposed use of floating shade balls is effective in deterring bat foraging above the reservoirs. Surveys will also help to determine if bats are colliding with aboveground structures or if there are incidents of bats drowning in the reservoirs.
- **Implementation of Bat Deterrent Measures.** If monitoring shows that bats are attracted to the reservoirs, then implementation of bat deterrent measures (e.g., acoustic deterrents such as those used at wind projects) is recommended.

In addition to the WDFW-proposed changes to the WMP noted above to help identify and mitigate for impacts to terrestrial species and habitats, additions to the WMP are also identified in Section 4.6.2.3 for aquatic species and habitats.

4.7.2.4 Significant and Unavoidable Adverse Impacts

Construction was determined to include temporary significant adverse impacts from degradation of John Day Talus and cliff/slope mixed pine forest (Priority Habitat and Species mapped as Oak/Pine Mixed Forest) between the lower and upper reservoirs. It was also determined that construction could result in significant adverse impacts through temporary disturbance of golden eagles, which would constitute "take" under the Bald and Golden Eagle Act, or temporary disturbance of other state priority species.

Proposed project operations were determined to include potential significant adverse impacts to John Day Talus and Cliffs habitats that may no longer support nesting raptors. Operations could also have indirect significant adverse impacts to raptor species, such as prairie falcons and golden eagles, and indirect significant impacts to state threatened western gray squirrel.

However, mitigation specific to these impacts is proposed and includes measures to avoid, minimize, rectify, reduce, or compensate for lost resources and functions. Through compliance with laws and with implementation of the mitigation measures described in Section 4.7.2.3, there would be no significant and unavoidable adverse impacts related to terrestrial species and habitats from construction or operation of the proposed project.

4.7.3 Findings for the No Action Alternative

The No Action Alternative represents the future terrestrial habitat conditions within the study area in the absence of implementing the proposed project. KPUD would continue to hold the existing water right, which may be held in trust or sold to other purchasers of water. The wind energy project and other existing energy infrastructure in the study area would continue to be operated. Investigation of contamination and development of cleanup actions on the CGA cleanup site would continue through a separate MTCA cleanup process.

In the absence of the proposed project fully removing the WSI, it is unknown what cleanup action would be required for the WSI through the full site cleanup process, which is underway. For purposes of evaluating the No Action Alternative, it is assumed that the WSI would remain intact and continue to be monitored and maintained under the existing closure plan. However, the WSI would remain within the ongoing MTCA cleanup process for the smelter site and could be subject to additional remedial actions potentially requiring long-term stewardship measures, monitoring, and land-use restrictions that would be expected to be part of the cleanup plan.

A cleanup action could improve overall conditions for wildlife and their habitats, but could involve impacts to existing vegetation and increased noise and vibration that could lead to additional direct and indirect impacts on plants, mammals, reptiles, invertebrates, and special status species. Wildlife species that are less tolerant of human activity, that require larger areas of continuous habitat, or that require darkness for nighttime navigation could experience impacts during construction of a cleanup action.

Under the No Action Alternative, the study area would be expected to continue to support the current terrestrial species and habitats. Overall, the No Action Alternative would not be expected to result in a significant adverse impact on terrestrial habitats. No impacts are expected to occur that would cause increased risks to overall species viability or increase the need for federal or state listing of a species. Through compliance with laws and with implementation of appropriately determined mitigation measures, there would be no significant adverse impacts related to terrestrial species and habitats from the No Action Alternative.

4.8 Aesthetics/Visual Quality

Visual quality, or aesthetics, refers to natural and human landscapes and how people see them. Visual quality is the value that people place on observing their surrounding environment. This section describes the current visual quality in the study area and potential impacts related to visual quality in the surrounding landscape.

The study area was delineated by places in the surrounding landscape where viewers may perceive a change in visual character and quality, as shown in Figure 4.8-1. The study area extends beyond the project footprint and areas used for construction, to the Columbia Hills and Columbia River viewsheds. This includes areas adjacent to the proposed project area where light or glare from construction or the completed project could be visible. The study area includes the visual environment along the river, including the observable viewshed features, and along the upper and lower plateaus where the upper and lower reservoirs are proposed. The viewshed includes areas where any visual interruptions can be seen in the line of sight, which includes natural and human-made features and new sources of light or glare. The upper and lower reservoir areas have distinct visual settings and are separated by a large elevation change, thus the viewshed was defined as two landscape units for this analysis.

The Applicant conducted an Aesthetic Resources Study in 2019 and provided five key viewpoints to reflect existing and proposed conditions for the proposed project (FFP 2020g). Locations and directional views for the key viewpoints are shown in Figure 4.8-1. Key viewpoints within each landscape unit were selected for this analysis to illustrate proposed project elements using representative photographs and visual simulations from the Applicant's 2019 study. The photographs serve as a baseline of existing conditions and to illustrate changes to the existing views.

Key Findings of the Aesthetics/ Visual Quality Analysis

The analysis found the proposed project would have **no significant and unavoidable adverse impacts** related to aesthetics and visual quality.

Visual changes from construction would be disruptive to the natural harmony, cultural order, and coherence. These changes may affect viewers intermittently over the 5-year construction duration.

The operational project reservoirs would be dominant structures from some viewpoints, and viewers may be aware of the visual changes; however, important views would still be available. For many viewpoints, the reservoirs would be consistent with the surrounding landscape and would only be seen from a distance for most accessible areas.

There would also be impacts to Tribes from the view changes, which are described in Section 4.9 and the Tribal Resources Analysis Report (Appendix H).

Mitigation is not required to reduce any significant impacts, but strategies are proposed to further reduce potential impacts.

Visual Analysis Terminology

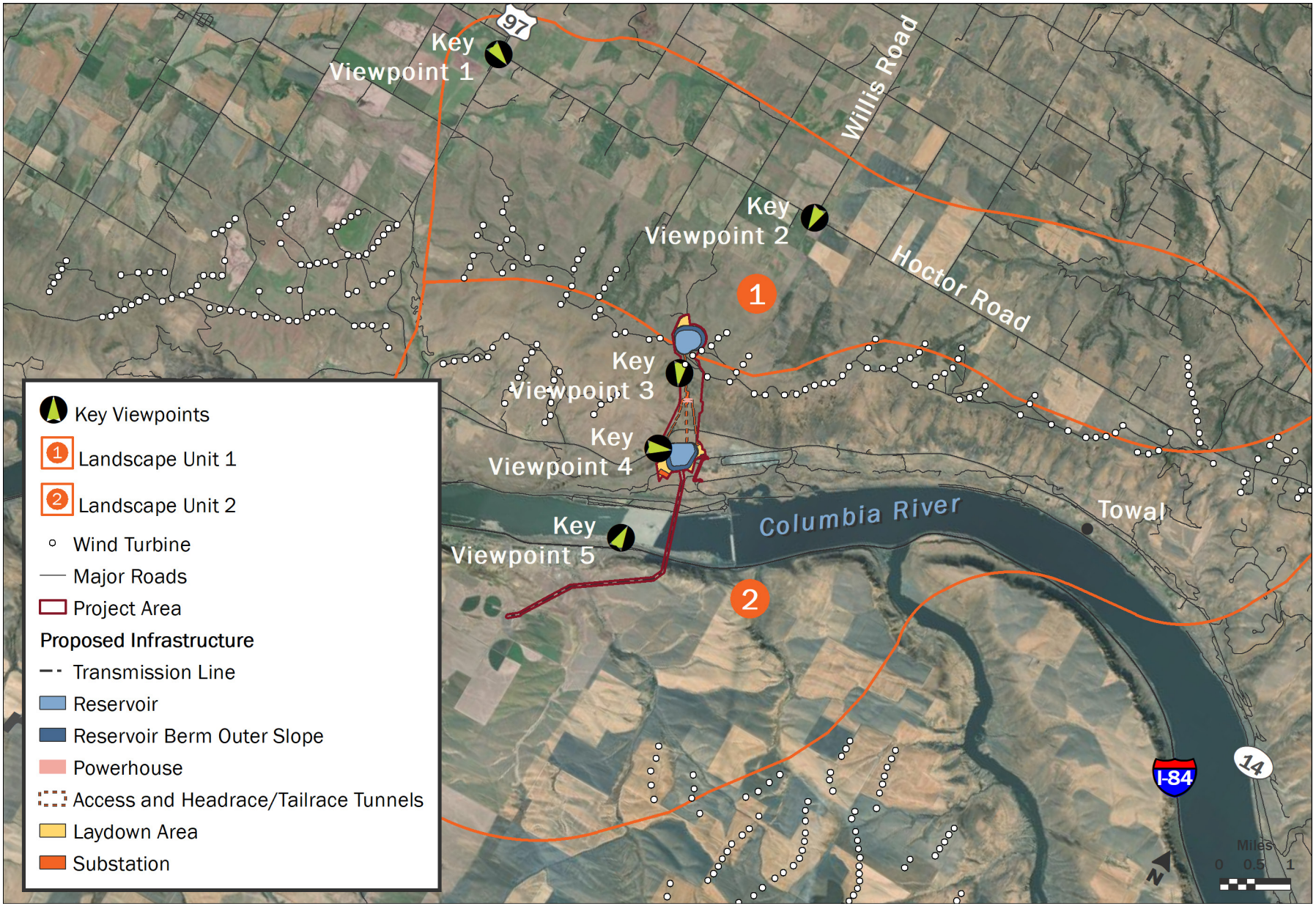
Viewshed: Areas where visual interruptions can be seen in the line of sight

Landscape Unit: Geographic areas that have a distinct visual identity within a single viewshed (USDOT 2015)

Key Viewpoint: Key viewpoints were selected within the viewshed to represent the visual character of the environment or the proposed project as it may be seen

Sensitive Viewer: Viewers that are sensitive to view changes or visual quality including changes in shadow, light levels, and glare that could interfere with views

Figure 4.8 1
Aesthetics and Visual Quality Study Area, Landscape Units, and Key Viewpoints



Data Source: FFP 2020g

Landscape unit 1 is defined by the upper plateau and is characterized by a large area of rangeland with agricultural fields and structures, wind turbines, roads and highways, power transmission lines, and a small area of woodlands. Landscape unit 1 is located about 2,500 feet above the Columbia River and includes the area where the upper reservoir would be located for the proposed project. The majority of viewers in landscape unit 1 consist of travelers on local roads and residents of the rural communities and the surrounding agricultural lands. Most of the land in landscape unit 1 is privately owned agricultural fields and rangelands. Other residents that may be in the area include people from Goldendale, located just north of landscape unit 1. People traveling in vehicles may observe the surrounding views and are likely to travel through but are unlikely to stop for destinations in landscape unit 1 within the project area.

The views have a moderate level of natural harmony as the area is mostly open grasslands. However, the views are obstructed by wind turbines. Cultural order is moderate due to the general orderly view of open grasslands but there is a low level of harmony with the surrounding landscapes with the wind turbines and roads. Within landscape unit 1, there are the following two key viewpoints:

- **Key viewpoint 1** is at the intersection of Hoctor Road and U.S. Route 97 facing east. The foreground consists of flat grassy agricultural land and the middle ground includes hilly grassland, shrub steppe, and woodlands. The Columbia Hills, wind turbines, transmission lines, and residential and agricultural structures such as farmhouses and barns are in the background. Viewers include travelers on U.S. Route 97 and individuals from Goldendale and the rural communities. U.S. Route 97 is a heavily travelled highway with an annual average daily traffic count of 5,100 vehicles (for the year 2020) at the intersection of Hoctor Road (WSDOT 2021a).
- **Key viewpoint 2** is at the intersection of Willis Road and Hoctor Road facing southeast. Views include agricultural land and vegetated hills in the foreground and the Columbia Hills, wind turbines, power poles and transmission lines, and residential and agricultural structures such as farmhouses and barns in the background. Viewers include rural residents and travelers along Hoctor Road.

Visual Quality Analysis Elements

The Federal Highway Administration uses the following three elements to analyze visual quality (USDOT 2015):

- **Natural Harmony:** What a viewer likes and dislikes about the natural environment. The viewer labels the visual resources of the natural environment as being either harmonious (desirable) or inharmonious (undesirable).
- **Cultural Order:** What a viewer likes and dislikes about the cultural environment. The viewer labels the visual resources of the cultural environment as being either orderly (desirable) or disorderly (undesirable).
- **Project Coherence:** What the viewer likes and dislikes about the project environment. The viewer labels the visual resources of the project environment as being either coherent (desirable) or incoherent (undesirable).

Landscape unit 2 includes the nearby portion of the Columbia River, its shorelines, and adjacent areas in Oregon and Washington. The lower plateau around the proposed project is characterized by current and historic industrial activities related to John Day Dam, BPA transmission corridors, and the former CGA smelter. The upslope from the lower plateau meets the edge of landscape unit 1 atop the ridge of the Columbia Hills. The lower plateau is at elevations of about 500 feet above the Columbia River and includes the area where the lower reservoir would be located for the proposed project.

There are no homes immediately adjacent to the proposed project area, but a single reported residence is 0.4 mile away from the lower reservoir area in landscape unit 2 (FFP 2020a, 2022a). Viewers in landscape unit 2 consist of travelers on scenic highway SR 14, Interstate 84, and recreational users along the Columbia River or at nearby parks and trails. SR 14, which includes the Lewis and Clark Scenic

Trail Highway, is a highly trafficked scenic highway with an annual average daily traffic count of 4,700 vehicles (for the year 2020) at milepost 1.89, east of the intersection with U.S. Route 97 (WSDOT 2021a). Interstate 84, another scenic highway that runs along the Columbia River south of the project site in Oregon, is also a heavily travelled scenic highway with an annual average daily traffic count of 12,700 vehicles around milepost 109 (ODOT 2021). This milepost is located east of the interchange at the City of Rufus along Interstate 84, approximately 3 miles northeast of where the project boundary crosses over the Columbia River to Oregon.

The features of landscape unit 2 include both natural elements, such as the Columbia Hills and Columbia River, and human-made elements, such as wind turbines, John Day Dam, and power transmission corridors, creating a moderate level of natural harmony. The cultural order is also moderate due to the mix of uses that can be seen from views within landscape unit 2.

The following three key viewpoints are within landscape unit 2:

- **Key viewpoint 3** is at the top of the Columbia Hills ridge at Juniper Point, facing southeast. Views include the Columbia Gorge and the river below cliffs, the mouth of the John Day River in Oregon, and views overlooking the lower plateau and agricultural lands, SR 14, Interstate 84, John Day Dam, the former CGA smelter, wind turbines, and transmission lines. Viewers from key viewpoint 3 include members of Tribes, as Juniper Point is a location of cultural significance for local Tribes (FFP 2020a). This area is not publicly accessible and therefore would likely not include other viewers.
- **Key viewpoint 4** is on the southeast side of scenic highway SR 14 in the lower plateau facing northeast. Views include the Columbia Hills, basalt cliffs, the Columbia River, SR 14, Interstate 84, the former CGA smelter, John Day Dam, transmission lines, wind turbines, railroad tracks, and potential recreational users along the river. Viewers of this viewpoint would include travelers along SR 14, or the Lewis and Clark Scenic Trail Highway. Highway travelers would have a reduced ability to focus attention on the proposed project area due to the speed at which they would be traveling through the area.
- **Key viewpoint 5** is along the southern bank of the Columbia River in Giles French/John Day Dam Park near the town of Rufus, Oregon, facing northwest. Views from this location are publicly accessible and include the Columbia River, Columbia Hills, basalt cliffs, Interstate 84, SR 14, John Day Dam, transmission lines, wind turbines, commercial and residential buildings in Rufus, and recreational users along the river. Viewers of key viewpoint 5 include park users along the Columbia River, residents and travelers within the town of Rufus, and travelers along Interstate 84.

4.8.1 How Impacts Were Analyzed

The analysis looked at areas where the proposed project would be visible and evaluated visual quality following Chapter 459 of the WSDOT Environmental Manual and guidance developed by the Federal Highway Administration's Visual Impact Assessment Process (USDOT 2015; WSDOT 2020). The Federal Highway Administration visual impact assessment process is carried out in the following four phases:

- Establishment: Defines the regulatory context and the study area based on project visibility and the visual character of the proposed project.
- Inventory: Defines key viewpoints based on project visibility and viewers that would experience view changes, and describes the visual character and visual quality of the affected environment.

- Analysis: Evaluates project impacts on visual quality based on the compatibility of impacts (ability of the environment to absorb project changes in surrounding environment) and the sensitivity of viewers to visual quality.
- Mitigation: Defines enhancement efforts that may be included in the project design.

Following this process, impacts to visual and aesthetic resources were evaluated qualitatively as follows:

- Areas with a distinct landscape character were categorized and described within landscape units.
- The area of visual effect was defined and mapped, showing the location of project and associated key viewpoints, and identifying potential sources of light and glare.
- Representative images and descriptions of the visual character of the area were reviewed to identify the visual resources of the natural, cultural, and project environments.
- Likely viewers (including neighbors and travelers) were considered, along with their self-interest, sensitivity to visual change, and visual preferences.
- Existing visual quality was assessed by identifying viewers' impressions of existing visual character.
- Potential direct and indirect visual impacts of the project were assessed, including both temporary and permanent changes to the landscape in the proposed project area, in consideration of applicable laws and policies, and potential mitigation measures were identified.

Impacts on visual resources relate to changes to the environment and how viewers perceive them. The analysis examined whether the proposed project is compatible with the surrounding environment and can be visually absorbed into the environment. Aesthetic preferences of most viewers in the area were assumed to include the importance of preserving scenic highways, waterfront, and natural area views that fit within the character of the surrounding environment. Modifications to views were considered an impact to viewers if important elements of the view change in noticeable ways, if views were blocked, if viewers are sensitive to view changes, if overall visual quality is reduced, or if changes in shadow or light levels are obvious, and glare could be a safety hazard or interfere with views.

Impacts to Tribes from the view changes are analyzed in the *Tribal Resources Analysis Report* (Appendix H) and Section 4.9.

4.8.2 Findings for the Proposed Project

4.8.2.1 Impacts from Construction

Construction activities for the proposed project would be visible from viewpoints in landscape unit 2 but would not be visible from viewpoints in landscape unit 1. Visibility of the project is limited in landscape unit 1 because viewers, such as residents and travelers on Hoctor Road and other local roads, would be far behind the ridgeline of the Columbia Hills and the construction areas would not be easily visible. Construction would temporarily modify the visual character of the area for viewers in landscape unit 2. These impacts are estimated to last for 5 years, from 2025 to 2030.

The construction activities that would affect visual quality include the following:

- The creation of staging and stockpiling areas would affect the natural existing character of the landscape for areas around the proposed reservoir near the ridgeline of landscape unit 1 and near the Columbia River in landscape unit 2. Bare earth and mounds of soil would be visible during most of the construction and would be revegetated to revert areas back to pre-

construction conditions to the extent applicable. Although the staging and stockpiling areas would be temporary, viewers would be affected during the estimated 5-year construction time frame.

- Clearing and grading and several years of excavation activities—which could include drilling with a boring machine and blasting—would affect viewers in landscape unit 2 and a few sensitive viewers in landscape unit 1. These activities would also increase dust and debris that may be visible throughout construction.
- Construction equipment and vehicles would be visible throughout construction, including trucks and large cranes that would be used to move loads of material to construct the reservoirs and batch plants that would be built for concrete production. Equipment to string the transmission line on BPA structures would also be highly visible to viewers within landscape unit 2. The presence of these construction equipment and vehicles would degrade visual quality for viewers along SR 14 and recreational users near the project in landscape unit 2.
- Construction-related traffic would increase near the proposed project throughout the 5-year duration of construction and road detours could occur. As described in Section 4.13, Transportation, SR 14 and Hoctor Road could be subject to detours and additional traffic during construction. Implementation of local detours would be a short-term disruption for travelers along scenic SR 14 in both directions. As described in Section 4.13, the Applicant would be required to coordinate construction schedules and any associated road closures with WSDOT and Klickitat County to prevent substantial disruption.
- Creation of light and glare from construction lighting and equipment would be visible to viewers in landscape unit 2 and could be visible to a few select viewers in landscape unit 1, depending on whether the viewer is standing near the ridgeline of the Columbia Hills. Light and glare from construction would temporarily degrade nighttime views for travelers along SR 14 and recreational users along the waterfront parks. The light and glare from the construction equipment would only occur during acceptable construction hours.

The proposed project would be primarily on private lands. Public access is limited, with primary viewers limited to travelers on surrounding roadways, such as on SR 14, and recreational users at parks along the Columbia River. The natural harmony during construction would be viewed as inharmonious and undesirable to viewers that would be most sensitive to these views. Sensitive viewers include members of local Tribes from Juniper Point (see Section 4.9), travelers on SR 14, and recreational users along the Columbia River. The cultural order would be temporarily viewed as disorderly and undesirable and the difference in visual quality would create a moderately incoherent environment. Although construction would take place in a largely rural setting, the area immediately surrounding the proposed project is currently used for industrial purposes and construction would not dominate the views. Changes in light levels and glare during construction activities may temporarily alter important views.

The visual changes from construction would be disruptive to the natural harmony, cultural order, and coherence and may affect viewers intermittently over the duration of the expected 5 years of construction. There would be no significant adverse impacts during construction.

4.8.2.2 Impacts from Operation

Permanent changes resulting from the operational proposed project include the addition of views of the upper and lower reservoirs within the viewshed in landscape unit 2, particularly along publicly accessible routes, such as highways, and for park users. Due to the size and scale within the open landscape, different views of the reservoirs can be seen from key viewpoints 3, 4, and 5 within landscape unit 2.

Either reservoir could be completely full or both reservoirs could be partially full at a given time during operation (FFP 2020a).

The project would also require facility lighting, which may affect nighttime views within areas of the viewshed in landscape unit 2.

Given the concern for water quality degradation within the pumped storage system (see Section 4.2), the Applicant has proposed a mitigation measure that would place floating shade balls on the water surface of each reservoir to help reduce heating and evaporation of water. The small black plastic shade balls would cause the water surface to have a black or grey appearance to most viewers who perceive the reservoirs from above.

Photo: Eric Garcetti on Flickr

Shade balls being deployed on a reservoir in California

Photo: Flickr user Water Alternatives Photos

Shade balls floating on the surface of a reservoir in another project

Other project features, such as underground tunnels, would be below ground and therefore no visual impacts related to these features would occur once the project is completed. Potential operational impacts include the following:

- The visibility for viewers from communities and individual residences are discussed below for key viewpoints 1 and 2 within landscape unit 1. Project components have low visibility from landscape unit 1 or would not be visible at all because of the distance of viewers from the ridgeline and natural topography that limits views of lower elevations.
- Visibility for recreational users from preservation and recreation areas and parks is discussed below for key viewpoint 5. Key viewpoint 5 is within landscape unit 2 along the Columbia River in Oregon. These viewers would be less sensitive to visual quality changes because the distance makes the views of the project components less visible and the project features blend within the existing surrounding landscape.
- Visibility from culturally significant sites is discussed below for key viewpoint 3. The location at key viewpoint 3 at Juniper Point is not publicly accessible and thus sensitive viewers are limited to members of Tribes. Key viewpoint 3 is located along the Columbia Hill ridgeline and views of the project components can be seen.
- Visibility of project components from transportation corridors is discussed below for key viewpoint 4. Viewers from key viewpoint 4 include travelers along the Lewis and Clark Scenic Trail Highway, or SR 14. Viewers from transportation corridors also include travelers along Interstate 84, another scenic highway that runs along the Columbia River in Oregon. Viewers from SR 14 would be more sensitive to project components because the highway is routed through the project area. However, the U.S. Department of Transportation (2015) notes that faster travel speeds reduce a viewer's sensitivity and ability to focus their attention. Traveling at 65 miles per hour, the area seen by a driver is reduced to a narrow 40-degree view, compared to 100 degrees of view at 25 miles per hour. Viewers along Interstate 84 would not be as sensitive to changes in

visual quality associated with the proposed project due to the distance and natural topography that creates a harmonious appearance from this distance, as well as the speed of travel.

Landscape Unit 1

Visual simulations of the changes at key viewpoints 1 and 2 (Figures 4.8-2 and 4.8-3) show there would be little to no potential operational impacts to viewers in landscape unit 1 because the proposed project would be barely visible from these views. The distance and angles of the Columbia Hills reduce the visibility of the project features from residential and agricultural properties near these viewpoints. The viewers of key viewpoints 1 and 2 would label the visual quality of the natural harmony in the landscape as harmonious, cultural order would be viewed as orderly and desirable, and the project coherence would be labeled as coherent because there is little to no view of the proposed project from both views. These changes from key viewpoints 1 and 2 would not result in significant adverse impacts to viewers.

Figure 4.8 2
Existing View (top) and Visual Simulation (bottom) of Proposed Project from Key Viewpoint 1

Source: FFP 2020g

Figure 4.8 3
Existing View (top) and Visual Simulation (bottom) of Proposed Project from Key Viewpoint 2

Source: FFP 2020g

Landscape Unit 2

Sensitive viewers in landscape unit 2 include local Tribes utilizing Juniper Point, travelers along the two scenic highways SR 14 and Interstate 84, and recreationalists within parks along the Columbia River. Visual simulations of the changes at key viewpoints 3 and 4 (Figures 4.8-4 and 4.8-5) show views of the lower reservoir, substation, and transmission lines along the lower plateau. Note these simulations from the Applicant (FFP 2020g) depict a full reservoir. The simulations also do not depict the floating shade balls on the water surface that are being proposed for water quality mitigation. Refer to the photographs from other reservoirs at the start of this section for visual information about the shade balls.

Members of Tribes who would be the viewers from key viewpoint 3 may feel the natural harmony is inharmonious and undesirable when comparing the proposed landscape to the existing natural landscape. For impacts to Tribal members, refer to Section 4.9 and the *Tribal Resources Analysis Report* (Appendix H).

Non-Tribal viewers from key viewpoint 3 may also find the visibility of the reservoir and shade balls to contribute to impacts to natural harmony. Non-Tribal viewers from key viewpoint 3 may label the cultural order as somewhat orderly and the visual quality of the project environment as somewhat coherent. The proposed project features are somewhat compatible with the existing industrial development and other human-made or altered waterbodies, such as Lake Umatilla above John Day Dam, in the surrounding area. Impacts on non-Tribal viewers from key viewpoint 3 would not be significant; Tribal viewers are discussed in Section 4.9.

Figure 4.8 4
Existing View (top) and Visual Simulation (bottom) of Proposed Project from Key Viewpoint 3

Source: FFP 2020g

Key viewpoint 4 is located on the scenic highway, SR 14, and shows the visual impact of the proposed lower reservoir from the views of a traveler along the highway. These SR 14 travelers would be the primary viewers of key viewpoint 4 (Figure 4.8-5). The views will include the developed proposed lower reservoir in the foreground. Note these simulations from the Applicant (FFP 2020g) depict a full reservoir, and do not depict the floating shade balls on the water surface that are being proposed for water quality mitigation. Refer to the photographs from other reservoirs at the start of this section for visual information about the shade balls.

The visibility of a reservoir that may be partially full and contain shade balls, along with the industrial development in the background, may contribute to impacts to natural harmony. Cultural order in this

viewpoint is also affected as a result of consistency in the surrounding industrial land use and human-made structures. However, these impacts on viewers from key viewpoint 4 would not result in a significant adverse impact because the speed of travel along this area would reduce the ability for highway travelers to focus attention on the proposed project, and the views of the natural environment and visual character would still be available to the primary viewers.

Figure 4.8 5
Existing View (top) and Visual Simulation (bottom) of Proposed Project from Key Viewpoint 4

Source: FFP 2020g

A visual simulation of the changes at key viewpoint 5 (Figure 4.8-6) shows views of the lower reservoir berm. The angle and distance limit the views of the reservoir berm to appear as a brown mass along the hills. The color and form of the berm blend into the existing landscape, and similar to key viewpoint 4, the speed of travel along this area would reduce the ability for highway travelers to focus attention on the proposed project. Therefore, the operational impacts on viewers from key viewpoint 5 would not result in significant adverse impacts.

Figure 4.8 6
Existing View (top) and Visual Simulation (bottom) of Proposed Project from Key Viewpoint 5

Source: FFP 2020g

Overall, operation of the proposed project would not result in significant adverse impacts (Table 4.8-1). While the facility would be a dominant structure from several viewpoints, and some viewers would be aware of the visual changes, important views would still be available. Views of the proposed project from landscape unit 1 are limited and changes would not affect much of the view from nearby residential properties. The views from landscape unit 2 would mainly affect travelers and recreational users due to the scale of the reservoirs. However, the reservoirs are consistent with the surrounding landscape and can only be seen from a distance for most accessible areas.

There would be operational impacts to Tribal members. Impacts to Tribal members related to their visual understanding of the area and the proposed project, including their perspective from key viewpoint 3, are discussed in Section 4.9 and the *Tribal Resources Analysis Report* (Appendix H).

Table 4.8-1
Summary of Impacts at Viewpoints

LANDSCAPE UNIT 1	POTENTIAL IMPACT LEVEL
Viewpoint 1	Little to no potential visual impacts to viewers
Viewpoint 2	Little to no potential visual impacts to viewers
LANDSCAPE UNIT 2	**POTENTIAL IMPACT LEVEL**
Viewpoint 3	Visual impacts on non-Tribal viewers would not result in any significant impacts
Viewpoint 4	Visual impacts on viewers would not result in any significant impacts
Viewpoint 5	Visual impacts on viewers would not result in any significant impacts

4.8.2.3 Proposed Mitigation Measures

Applicant-Proposed Mitigation Measures

No mitigation measures would be required because there would be no significant adverse impacts. Although not required to reduce any significant impacts, the Applicant proposed the following mitigation measures in an Aesthetic Resources Study Report (FFP 2020g) attached to the FERC FLA to further reduce potential impacts to aesthetics and visual quality from construction and operation of the proposed project:

- **Minimize Construction Debris.** BMPs will be implemented during construction to reduce construction-related debris that may be visible from off site. Where practical, designated locations will be established for the temporary storage of debris from construction.
- **Design to Reduce the Degree of Contrast.** The Applicant proposes to minimize the aboveground footprint of the project to the furthest extent possible, use engineering controls to reduce contrasts from sensitive viewing areas, minimize or dull reflective surfaces, and paint surfaces to match natural colors of the surrounding landscape.
- **Revegetate Some Areas.** The Applicant proposes to install native vegetation to break up the lines of roads and facilities and reduce visual impacts of proposed features where possible. Vegetation management will be required adjacent to the reservoirs to deter wildlife (see Sections 4.6 and 4.7); therefore, revegetation of all disturbed areas will not be possible.
- **Minimize Exterior Lighting and Nighttime Light Pollution.** The Applicant proposes to minimize lighting through the following methods:
  - 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 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.
  - Minimize 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.

Relevant Mitigation Measures in Other Sections

In addition to the Applicant-proposed measures, implementation of mitigation proposed in other sections of this EIS would also further reduce potential impacts to aesthetics and visual quality.

The following is a brief summary of Ecology-proposed air quality and GHG mitigation measures; Section 4.3.2.3 and the *Air Quality and Greenhouse Gases Resource Analysis Report* (Appendix D) contain complete descriptions of these measures:

- **Use of Best Management Practices During Construction.** Strategies that could be used to reduce fugitive dust would also minimize visual changes from off site. These measures include spraying soil with water, minimizing idling of equipment, covering material piles, sweeping, installation of dust collectors, applying dust suppressant, or timing construction to avoid high winds (see Section 4.3).

4.8.2.4 Significant and Unavoidable Adverse Impacts

The analysis found the proposed project would have no significant and unavoidable adverse impacts related to aesthetics and visual quality from construction or operation of the proposed project. Although not required to reduce any significant impacts, mitigation measures described in Section 4.8.2.3 are proposed to further reduce potential impacts to aesthetics and visual quality.

Significant impacts to Tribal members are discussed in Section 4.9 and the *Tribal Resources Analysis Report* (Appendix H).

4.8.3 Findings for the No Action Alternative

Under the No Action Alternative, the proposed project facilities would not be constructed. The wind energy project and other existing energy infrastructure in the study area would continue to be operated. Investigation of contamination and development of cleanup actions on the CGA cleanup site would continue through a separate MTCA cleanup process. In the absence of the proposed project fully removing the WSI, it is unknown what cleanup action would be required for the WSI through the full site cleanup process, which is underway. For purposes of evaluating the No Action Alternative, it is assumed that the WSI would remain intact and continue to be monitored and maintained under the existing closure plan. This is not expected to result in adverse changes to visual quality in the study area. Therefore, there would be no significant adverse impacts related to aesthetics and visual quality from the No Action Alternative.

4.9 Cultural and Tribal Resources

This section describes Tribal and cultural resources in the study area and potential impacts and mitigation measures related to those resources.

Tribal resources refers to the collective rights and access to traditional areas and times for gathering resources associated with an Indian Tribe's sovereignty since time immemorial. It includes inherent rights or formal treaty rights associated with usual and accustomed territories. In addition, Tribal resources includes areas important to traditional cultural practices and the natural and cultural resources associated with those practices including plants, wildlife, or fish used for commercial, subsistence, and ceremonial purposes. This section summarizes information about Tribal resources that may be impacted for Yakama Nation, including the Kah-Milt-Pah (Rock Creek Band) [3]; the Confederated Tribes of the Umatilla Indian Reservation; the Confederated Bands of the Warm Springs Reservation of Oregon; and the Nez Perce Tribe.

Resources may also include archaeological or historic sites or Traditional Cultural Properties (TCPs) associated with Tribal use and sites considered sacred by Tribes. These resources are described in more detail in the *Tribal Resources Analysis Report* (Appendix H).

Cultural resources are often grouped together as "historic properties." Historic properties are prehistoric or historic districts as well as historic and archaeological sites, structures, or objects that are listed in (or eligible for listing in) preservation registers such as the National Register of Historic Places (NRHP), the Washington Heritage Register, or local preservation registers. The cultural resources terminology used in this section is primarily adopted from the NRHP program because the program has extensive guidance on describing and evaluating historic properties. In addition, archaeological sites are protected under RCW 27.53 regardless of whether they are eligible for a preservation register.

Key Findings of the Tribal and Cultural Resources Analysis

The analysis found the proposed project would result in **significant and unavoidable adverse impacts** related to Tribal and cultural resources.

It is important to acknowledge the Tribes' perspectives on the impacts of the proposed project. Some mitigation options for Tribal and cultural resources have been proposed by the Applicant. However, **to date, there is no information available about mitigation proposed by or supported by the Tribes that would reduce the level of impact to less than significant.**

A **district** is a significant concentration, linkage, or continuity of sites, structures, or objects united by past events or aesthetically by plan or physical development.

A **Traditional Cultural Property (TCP)** is significant based on its associations with the cultural practices, traditions, beliefs, lifeways, arts, crafts, or social institutions of a living community.

A **Cultural Landscape (CL)** is significant as a geographic area, including both cultural and natural resources and the wildlife or domestic animals therein, associated with a historic event, activity, or person, or exhibiting other cultural or aesthetic values.

[3] Kah-Milt-Pah is one of the bands and Tribes in the Yakama confederation. Ecology's government-to-government consultation process is with the Yakama Nation, but because the Kah-Milt-Pah (Rock Creek Band) submitted a separate scoping letter for the SEPA EIS, their comments are also discussed by name in this report.

An NRHP-eligible site, structure, object, or district may also qualify as a TCP or Cultural Landscape (CL). TCPs and CLs are defined by the National Park Service, in recognition that some historic properties have significant cultural meaning, use, or organization (Parker and King 1992; Birnbaum 1994). The identification of TCPs and CLs allows for the consideration of ongoing cultural meaning and holistic function in inventory and evaluation of historic properties. Several TCPs have been identified in the project vicinity.

Under RCW 27.53, an archaeological site is "a geographic locality in Washington, including but not limited to, submerged and submersible lands and the bed of the sea within the state's jurisdiction, that contains archaeological objects."

Some groups of NRHP-eligible resources are connected by their association to a shared historic context, whether or not they are spatially grouped together. These resources may together be documented on a Multiple Property Documentation (MPD) form. An MPD group is not an NRHP district, but rather a way to document individual NRHP-eligible properties to emphasize their connectedness and shared expression of a theme. Although MPDs are not a common method of documenting properties, several have been identified in the project vicinity that include both archaeological sites and TCPs.

Tribal resources, archaeological sites, TCPs, and natural resources often can be interconnected and overlapping as Tribal resources.

The study area is the area in which an action related to the proposed project could directly or indirectly impact historic properties (register-eligible sites, structures, objects, or districts), non-register-eligible archaeological sites, or Tribal resources. There are no potentially historic standing structures in the study area, and no CLs have been identified. No human remains or cemeteries have been identified in the study area; however, there remains a possibility of inadvertent discovery of remains that were not previously identified. Therefore, this impact analysis focuses on archaeological resources, TCPs (some of which are grouped together in MPDs), and other Tribal resources. The geographic extent of Tribal resources and TCPs that could be impacted could extend well beyond the proposed project footprint.

The study area is within lands ceded by the Treaty with the Yakama (1855). Additionally, the study area is, and has historically been, used by the Yakama Nation, Confederated Tribes of the Umatilla Indian Reservation, the Confederated Bands of the Warm Springs Reservation of Oregon, and the Nez Perce Tribe for hunting, traditional gathering, camping, and traditional Tribal rituals, such as ceremonies and vision quests.

Archaeological and ethnographic studies have been conducted in the study area and have inventoried archaeological sites and TCPs (Shellenberger et al. 2019; Davis et al. 2021; Moon 2021; FFP 2021d). These studies are confidential but were shared with Ecology and are generally summarized in this section.

The study area was intensively used in the past, and this use is reflected by a dense concentration of archaeological sites. According to the Department of Archaeology and Historic Preservation, 79% of the study area is within high risk or very high risk areas for the possibility of encountering archaeological sites (DAHP 2022a). Archaeological sites have been recorded in the study area, and the study area is also entirely within the Columbia Hills Archaeological District.

The Yakama Nation has identified two specific TCPs in the study area: *Pushpum* and *Nch'ima*. The Confederated Bands of the Warm Springs Reservation of Oregon supports the Yakama Nation on the significance of these TCPs. Resources in the study area, including both archaeological sites and TCPs,

also contribute to two MPDs documented by the Yakama Nation: the Columbia Hills MPD and the Coyote's Journey MPD.

Pushpum is located within and beyond the study area. It is the location of ongoing harvests of traditional resources, as well as the associated ceremonies, rites, and traditions, which are closely tied to specific locations. This ongoing use is demonstrated in the archaeological sites in the vicinity. *Pushpum* is NRHP-eligible. *Nch'ima* is an extensive fishing ground and village site located within and beyond the study area. *Nch'ima* is significantly associated with traditional cultural practices and knowledge, the history of which is demonstrated in the archaeological sites in the vicinity, and is NRHP-eligible.

The Confederated Tribes of the Umatilla Indian Reservation identified two TCPs: one is *Pushpum* and the other is unnamed in publicly available materials. Detailed information about the unnamed TCP is confidential, though the Tribe has indicated in materials shared with Ecology that they have used the unnamed TCP area for traditional activities since time immemorial.

The Columbia Hills MPD comprises archaeological sites, locations associated with legends, and places where traditional practices occur, across the Columbia Hills region. The entire study area is within the MPD. The Coyote's Journey MPD comprises locations across the entire Columbia Basin that are associated with Creation (archaeological sites and other ritually and culturally significant locations). Both MPDs are NRHP-eligible.

Documentation prepared by the Nez Perce Tribe offers a similar evaluation of the importance of traditional gathering and ritual activities. The Tribe emphasizes that the resources in the study area are part of a much larger integrated cultural network, and impacts can extend far beyond the study area in space and time. The Confederated Bands of the Warm Springs Reservation of Oregon supports the Nez Perce Tribe on the significance of these TCPs.

Natural resources important to Tribes are also Tribal resources. Plant gathering is an essential subsistence and cultural activity that is documented in ethnographic literature, Tribal legend and stories, and archaeological sites. Plants were historically and are currently gathered for food, medicine, and ritual uses, as well as for raw material for tools, clothing, basketry and mats, and other uses. Important plant species in the proposed project area include smooth desert parsley, biscuitroot, and serviceberry, as well as a wide variety of other plants. These resources are described in more detail in the *Tribal Resources Analysis Report* (Appendix H).

During consultation on the proposed project, the Yakama Nation indicated that root harvest is associated with many significant traditional cultural practices, including sharing with elders and provisioning feasts and other events.

Important animal species are also present in the proposed project area. Several ephemeral waterbodies in the proposed project area drain to Swale Creek, a tributary to the Klickitat River, which is a tributary to the Columbia River. The Columbia River is adjacent to the lower reaches of the proposed project area. The ephemeral waterbodies could provide habitat for amphibians, and the Columbia River hosts a wide variety of migratory and resident species, as well as non-native species. Of particular importance are salmon and trout, suckers, and lamprey species. The proposed project area also includes a variety of habitat for terrestrial species, including birds, mammals, bats, and reptiles. Important subsistence species include mule deer, elk, porcupines, various small mammals, grouse, and waterfowl. Bird species that may be culturally important, such as eagles, corvids, and other raptors, also occur in the proposed project vicinity. These resources are described in more detail in the *Tribal Resources Analysis Report* (Appendix H).

Preservation of land and culture is essential to the identity of the Tribes. It provides the living space, the sacred and cultural sites, and the natural resources that sustain Tribal peoples and cultures. It provides spiritual and physical sustenance, and the means for economic self-sufficiency.

Incorporating Tribal input received through consultation and sources provided by Tribes provides a more complete analysis of the short and long-term consequences of any proposed project alternation to the landscape. Ecology is continuing to consult with Tribes regarding documentation of Tribal and cultural resources and impacts on the resources important to Tribes, and further information may be provided in the future.

4.9.1 How Impacts Were Analyzed

Regarding Tribal resources, research and consultation have identified a number of natural and cultural resources of importance to Tribes that could be impacted by the proposed project. The analysis of impacts to Tribal resources differs in its approach when compared to the impact analysis for other natural resources. Natural resources are analyzed elsewhere in Chapter 4 to determine if the proposed project would have significant adverse impacts from a non-Tribal perspective, and whether or not they could be mitigated.

The analysis for Tribal resources references those analyses, but also considers the Tribes' unique and powerful connection to and reliance on cultural and natural resources. As a result of this connection, Tribes hold a deep, intimate knowledge and understanding of the ecosystem, often referred to as Tribal Ecological Knowledge. USFWS defines Tribal Ecological Knowledge as "the evolving knowledge acquired by indigenous and local peoples over hundreds or thousands of years through direct contact with the environment" (Rinkevich et al. 2011). Tribal Ecological Knowledge is a valuable source of information and will continue to be considered as impacts from the proposed project are evaluated.

In order to honor the Tribes' perspective, the analysis considers all identified impacts to natural resources and cultural resources. This section includes consideration of the unique perspectives and specific impacts to the Tribes and adds cultural context when evaluating project impacts.

Regarding cultural resources, research has identified archaeological sites in the study area, as well as traditional cultural practices that indicate potential for TCPs. For this analysis, impacts from the proposed project, including ground disturbance, changes to the landscape, and changes to access, were compared to information about known historic properties to determine impacts. In the case of TCPs, government-to-government Tribal consultation (RCW 43.376) and informal coordination between Ecology and Tribal governments informed, and will continue to inform, the analysis of impacts.

The analysis looked at potential direct impacts including the following:

- Disturbance of or damage to an archaeological site (including contributing sites to an archaeological district)
- Removal of access to a TCP, or diminution of its important characteristics
- Intrusion to the setting of a historic structure or TCP (if the setting is an important component of the property)
- Restrictions to access to culturally important locations
- Degradation of visual quality, noise, and interruption of the landscape and habitat
- Interruption of spiritual practices
- Loss of medicinal and traditional plants and foods
- Disruption and degradation of health and mental well-being of Tribal members

Impacts would be expected where historic properties have been identified in the vicinity of the proposed project, or in areas where the potential for encountering previously unrecorded historic properties during construction or operation of the proposed project is high to very high. The analysis also looked at potential indirect impacts related to any changes in the vicinity of an archaeological site that would make it more vulnerable to impacts such as vandalism or erosion, or potential for increased use that would cause impacts.

4.9.2 Findings for the Proposed Project

4.9.2.1 Impacts from Construction

Construction for the proposed project is estimated to last 5 years, from 2025 to late 2030. Activities that could impact Tribal and cultural resources include ground disturbance, restrictions to access, degradation of visual quality, noise, and interruption of the landscape and habitat. The Tribes' spiritual practices could be interrupted by construction impacts to land areas and cultural or sacred sites. In addition, access to traditional gathering areas for medicinal and traditional plants and foods would also be restricted during construction and permanently lost in the reservoir areas. The loss of Tribal connections and educational opportunities that result from restricted access to Tribal resources would disrupt and degrade Tribal members' health and mental well-being.

Ground disturbance for the project would include the following:

- Excavation of two reservoirs (up to 205 feet below the ground surface), underground conveyance tunnel and powerhouse (several thousand feet below the surface), electrical station/switchyard (up to 30 feet below the ground surface), and access tunnels and support structures (up to several thousand feet below the surface)
- Installation of underground utilities (up to 10 feet below the surface)
- Construction staging areas

Archaeological sites will be adversely affected by ground disturbance during construction. These sites are NRHP-eligible for their association with traditional use and practices. One of the sites is also significant for its scientific data potential. This means that important questions about human history can only be answered by the physical materials at the site. These sites and the Columbia Hills Archaeological District will be disturbed by construction of the proposed project, which constitutes a significant adverse impact. The Applicant has estimated that nearly all of four archaeological sites, and up to 20% of a fifth archaeological site, would be disturbed. The Washington State Department of Archaeology and Historic Preservation has estimated that 100% of 15 sites could be disturbed (DAHP 2022b). Ground disturbance will also occur in areas where no archaeological sites have been identified during recent surveys, but there is still a potential for previously unrecorded sites to be identified during construction. During consultation for the proposed project, Tribes have communicated that archaeological sites that can be seen on the surface are a teaching tool and impacts to the sites prevent this teaching. They also represent disrespect to the landscape.

Construction of the proposed project will occur in *Pushpum* and *Nch'ima,* which are areas used for resource gathering and other ritual and cultural activities. Construction will prevent those activities from occurring at reservoir and construction staging areas. Construction of the proposed project will limit, if not eliminate, use of these areas, which is a significant adverse impact. There is also a potential for significant adverse impacts on unrecorded archaeological sites that are associated with the TCPs.

Tribes have stated during consultation that impacts to Tribal members' ability to participate in, teach, learn, and share cultural practices affects the mental, spiritual, and physical health of Tribal members.

Restrictions to access and removal of areas used for cultural practices will indirectly affect entire Tribal communities and multiple generations.

As noted in Section 4.8, Aesthetics and Visual Quality, Tribes are sensitive viewers of this landscape, and construction would result in impacts to visual quality. The change in the natural state of the landscape could interrupt Tribal cultural practices and impact the expression of Tribal spirituality. This represents an intrusion to the setting and would constitute a significant adverse impact to the TCPs. This is also considered a significant adverse impact by the Tribes.

According to the Yakama Nation, "the archaeological and TCP sites are irreplaceable to the Yakama Nation's cultural resource inventory as a source of significant cultural and spiritual meaning for Yakama people" and construction of the project "unavoidably destroys cultural resources through earthworks and reservoir storage" (Yakama Nation 2021).

Construction of the proposed project would result in the direct mortality of plant species in the upper and lower reservoir footprints and construction areas, potentially including smooth desert parsley and other species used by Tribes. Access to food harvesting areas may be limited during construction. For a list of potentially culturally important species, see Section 3.3.2 of the *Tribal Resources Analysis Report* (Appendix H). Although the Applicant is expected to reseed remaining areas after construction with a mix of native plant species, there would be a loss of plant species, limited access to gathering opportunities during the 5-year construction period, and certain areas of harvest would be permanently destroyed in the reservoir areas, according to the Kah-Milt-Pah (Kah-Milt-Pah 2021). This would be a significant adverse impact to the Tribes. Reseeding would only partially mitigate the impact of construction.

As resources are not just shared within each Tribal community, but are also given to surrounding non-Tribal communities or shared among Tribes, impacts to Tribal gathering areas from construction of the proposed project would also result in an indirect significant adverse impact.

Construction of the proposed project would result in little to no impact to larger, more mobile animals such as deer, bobcat, coyote, and fox. Small mammals may be more affected, but this is likely to focus on mice, shrews, and voles because their range is smaller and they depend more on ground burrowing. Hunted small mammal species such as rabbits and squirrels are expected to be less affected. However, construction would impact terrestrial mammals associated with Tribal use. For a list of potentially culturally important species, see Section 3.3.2 of the *Tribal Resources Analysis Report* (Appendix H).

According to the *Terrestrial Species and Habitats Resource Analysis Report* (Appendix G), construction of the proposed project would have an indirect effect on terrestrial habitats. Construction would introduce new physical obstructions and increased human activity that would reduce habitat connectivity, by making it more difficult for some wildlife species to make daily and seasonal movements. According to the Kah-Milt-Pah, wildlife "take care of us to provide us with food, clothing and ceremonial instruments" (Kah-Milt-Pah 2021). If wildlife species that are used by Tribes for cultural or spiritual practices are reduced due to construction, this would be an indirect significant adverse impact to the Tribes.

Construction could result in impacts to birds if they are present in or near the construction areas. Breeding and pre-fledged birds are more likely to be directly affected by vegetation clearing, noise, and other construction activities, which could result in elimination of nesting and perching sites. These persistent disruptions would impact normal behavior of birds that are unable to leave the disturbance areas. If breeding and nesting sites are less than 0.5 mile from blasting activities, they could experience a significant adverse impact, which may impact species viability. Although mitigation is proposed by the

Applicant, even temporary movement of birds out of the project area could be a significant adverse impact to the Tribes.

Although the *Aquatic Species and Habitats Resource Analysis Report* (Appendix F) indicates there will be no direct impacts to aquatic habitat and species as a result of construction, Tribes have expressed concerns about how the proposed project may impact access to fishing sites. These sites include the Kah-Milt-Pah fish access sites at an ancient village site called *Willa-wit* and Yakama Nation access to the North Shore Treaty Fishing Access Site, which is a treaty fishing location in the Zone 6 Fishery.

4.9.2.2 Impacts from Operation

Operations are assumed to be a 45-year period beginning after the proposed project is completed. Operational activities that could affect Tribal and cultural resources include ongoing changes in access to the proposed project area with operations and increased human activity with associated noise, light, dust, and human presence. The permanent loss of land in the reservoir locations would impact Tribes in a number of ways including the interruption of culturally important activities.

Archaeological sites in the study area, and the Columbia Hills Archaeological District, could be impacted by the increase in activity in the study area during operation of the project. This includes increased vehicle traffic, vegetation management, or other activities causing ground disturbance, as well as the presence of people who might disturb surface artifacts. The sites, and therefore also the Columbia Hills Archaeological District, would likely be disturbed during operation of the proposed project, which constitutes a significant adverse impact. There is also a potential to impact unrecorded archaeological sites that are associated with the TCPs. Ongoing ground disturbance could occur in areas where no archaeological sites have been identified during recent surveys, but there is still a potential for previously unrecorded sites to be identified during operation.

Operation of the project will restrict access to activities associated with *Pushpum* and *Nch'ima*. As noted above, operation of the proposed project would also impact the associated archaeological sites due to the increased human activity and ongoing interruption of culturally significant activities. This constitutes a significant adverse impact. There is also a potential to impact unrecorded archaeological sites that are associated with the TCPs. According to the Yakama Nation, "the archaeological and TCP sites are irreplaceable to the Yakama Nation's cultural resource inventory as a source of significant cultural and spiritual meaning for Yakama people" and construction of the project "unavoidably destroys cultural resources through earthworks and reservoir storage" (Yakama Nation 2021).

Operation of the proposed project would restrict access to resource gathering and other ritual and cultural activities, especially in the reservoir areas. Per Yakama Nation Tribal Council Resolution T-089-21, there would be "direct, permanent and adverse destruction of nine TCPs of religious and ceremonial significance and the reduction and elimination of access to gather food and medicine roots, which results in an irreplaceable loss of cultural resources…" Any permanent restrictions to these areas would be a significant impact to the Tribes.

After completion of construction, some of the impacts on terrestrial habitats that resulted from construction would be ongoing, along with those associated impacts to the Tribes. Reseeding, rather than replanting, is proposed for post-construction habitat restoration. Reseeding results in a longer period of time before pre-construction habitat quality and function could be reached. This would not result in a significant adverse impact on terrestrial habitats, but would be a significant impact to the Tribes that use the project area for harvesting plants, especially in areas where habitat access would be permanently destroyed in the reservoir locations. The analysis of construction impacts in Section 4.9.2.1 assumes that Tribal access to gathering areas within the project footprint would be restored after construction. If access

is not restored, there would be an additional long-term significant adverse impact to Tribal resources during project operations.

The increased human activity in the study area with proposed project operations would decrease habitat quality for some species. This is expected to be an impact on most habitats. Significant adverse impacts could occur on talus and cliff habitat if it can no longer support breeding raptors because of the proximity of human development and reduced prey availability. This would result in a significant adverse impact to Tribal resources.

According to the *Aquatic Species and Habitats Resource Analysis Report* (Appendix F), no operational impacts are anticipated on fish or aquatic habitat from project operations. However, there may be impacts to the Tribes if they are unable to access established and culturally significant fishing areas. Although the Applicant does not expect any impacts to access, it remains a concern to Tribes.

As noted in Section 4.8, Aesthetics and Visual Quality, Tribes are sensitive viewers of this landscape, where disturbance of the natural landscape can impact the spirituality and well-being of the viewer, and the change from the natural landscape to proposed project features such as reservoirs and the substation would result in impacts to visual quality. Because these areas are of cultural importance to the Tribes, any change in landscape view could disrupt sacred religious and ceremonial practices. This change also constitutes an impact to the TCPs and would be a significant impact to Tribal resources.

4.9.2.3 Mitigation

Mitigation measures that could avoid, minimize, or reduce impacts of the proposed project on natural resources are detailed in Section 4.2, Water Resources, Section 4.6, Aquatic Species and Habitats, and Section 4.7, Terrestrial Species and Habitats. These include measures to mitigate impacts to golden eagles, protect aquatic species, protect water quality, restore native plant communities, manage noxious weeds, and collect data to inform the measures. Section 4.8, Aesthetics/Visual Quality, details mitigation measures that could avoid, minimize, or reduce visual impacts of the proposed project.

Mitigation measures specific to Tribal and cultural resources may include measures proposed by the Applicant, some of which are outlined in the Applicant's Draft Historic Properties Management Plan as part of the FERC license process (FFP 2021d).

Mitigation may also be developed under federal Section 106 of the National Historic Preservation Act, which requires resolution of adverse effects to historic properties (CFR 33.36.800.6). This is a separate, federal process that is underway but outside of the state's SEPA process.

In addition, the Applicant proposes to develop an Inadvertent Discovery Plan to avoid unforeseen impacts to archaeological sites, and proposes to comply with all permit requirements related to the protection of historic, archaeological, and cultural resources.

Through scoping comments to Ecology, conversations during technical meetings, media releases, and a Yakama Nation Tribal council resolution, Tribes have repeatedly indicated that mitigation would not reduce project impacts to the Tribes. The Yakama Nation stated in their scoping comment letter that "the proposed action will have significant adverse environmental impacts, many of which cannot be avoided or mitigated if Project implementation is permitted" (Yakama Nation 2021).

Yakama Nation scoping comments also included this statement about mitigation: "The damage to the Yakama Nation's cultural resources and the local aquatic and terrestrial resources disproportionately injures the heritage and traditional practices of Yakama people because mitigation cannot replace the

destruction of ancestral sites that are still used to observe ceremonial and cultural practices." In addition, the Yakama Nation 2021 Tribal Council Resolution T-089-21 includes a statement of opposition to the project: "the proposed pump storage development violates the Yakama Nation's inherent sovereignty and Treaty-reserved rights through direct, permanent, and adverse destruction of nine Traditional Cultural Properties of religious and ceremonial significance, and the reduction and elimination of access to gather food and medicine roots, which results in an irreplaceable loss of cultural resources and negative environmental degradation to several ephemeral waterbodies, and aquatic and terrestrial resources."

Furthermore, Yakama Nation has stated that "no amount of mitigation could address the impacts of this project to our culture today, or for our future generations…Due to the sacredness of this resource, this development would destroy the lives of our Tribal members" (Yakama Nation 2022).

The Confederated Tribes of the Umatilla Indian Reservation scoping comments included similar language: "There may be impacts for which no mitigation is possible…" Comments on this document from the Confederated Bands of the Warm Springs Reservation of Oregon also noted that "you propose to permanently destroy unique and irreplaceable resources."

As mentioned earlier in this section, this review seeks to reflect and incorporate the Tribes' perspectives of, values about, and relationships with the environment impacted by the proposed project. Tribal traditions are interwoven into the ecosystems in which Tribal members live, from hunting and gathering to sacred sites—places and activities that have spiritual and cultural meaning. The Applicant has proposed mitigation for impacts to some of the natural resources, but the Tribes have indicated that this is not sufficient. The proposed project will have unique impacts on Tribal communities and Tribal members. This section seeks to explain those impacts within the cultural context of the Tribes. Therefore, it is important to listen to the feedback provided by the Tribes on whether there is mitigation that will help to reduce project impacts. To date, there is no information available about mitigation proposed by or supported by the Tribes.

4.9.2.4 Significant and Unavoidable Adverse Impacts

Impacts are continuing to be determined through ongoing government-to-government consultation. Current understanding of the construction and operation of the proposed project indicates significant and unavoidable adverse impacts on Tribal and cultural resources. These impacts include hunting and traditional gathering of wildlife and vegetation, as well as archaeological sites and TCPs used for camping and traditional Tribal rituals, such as ceremonies and vision quests. Without effective mitigation that would reduce significant impacts to Tribal and cultural resources, those impacts would be considered unavoidable. Therefore, there would be significant and unavoidable adverse impacts to cultural resources, as well as the Tribes' ability to use TCPs and gather culturally important plants.

4.9.3 Findings for the No Action Alternative

Under the No Action Alternative, the proposed project facilities would not be constructed. Investigation of contamination and development of cleanup actions for the CGA smelter site would continue through a separate MTCA process, which would have its own SEPA determination. KPUD would continue to hold the existing water right, which may be held in trust or sold to other purchasers of water. The wind energy project and other existing energy infrastructure would continue to be operated.

Under the No Action Alternative, there would be no expected impacts to existing patterns of traditional use, or to archaeological sites. Therefore, no impacts would be expected to cultural and Tribal resources.

4.10 Environmental Health

Environmental health concerns include hazardous materials and contaminants that could affect the health of people and the environment. This section also considers physical safety risks, along with noise and vibration that could affect people and animals. The former CGA smelter that overlaps a portion of the site has contamination from historical industrial practices. Completion of the portion of the former CGA smelter site environmental cleanup that would be included in the Applicant's Prospective Purchaser Agreement is also considered in this section.

The *Environmental Health Resource Analysis Report*, in Appendix I, has the full description of existing conditions in the affected environment, as well as the full analysis and technical details used to evaluate environmental health. This section summarizes how impacts were evaluated and summarizes the findings of that report.

Sections 4.1, Soils and Geology, and 4.2, Water Resources, also have information relative to the existing conditions in the affected environment for this analysis. Section 4.5, Public Services and Utilities, describes public services including emergency response and emergency management that may be relevant to the environmental health and safety considerations in this section.

Key Findings of the Environmental Health Analysis

The analysis found the proposed project would have **no significant and unavoidable adverse impacts** related to environmental health. Mitigation is not required to reduce any significant impacts.

Construction and operation of the proposed project could cause possible spills, discharge, or disturbance of hazardous or contaminated materials. Required permits and plans would reduce these risks.

Completing the proposed WSI removal would permanently remove a large quantity of contaminated materials.

Noise and vibration are expected to be temporary and occur in areas where very few people could be affected.

There would be an extremely low probability for failure of a reservoir. Design, construction, planning, and monitoring requirements would further reduce associated risks.

The study area for environmental health encompasses the proposed project area, part of which is located within an active environmental cleanup site, as well as downgradient groundwaters, downstream ponds or streams, and the Columbia River adjacent to and downstream of the project footprint.

The area is arid, rural, and relatively isolated. Given the arid nature of the area, it is prone to risk of wildfires. There are no homes in or immediately adjacent to the proposed project area. There are scattered farm residences west and north of the northern extent of the proposed project, and a single reported residence is 0.4 mile away from the lower reservoir area (FFP 2020a, 2022a). The closest town is Goldendale, Washington, approximately 8 miles northwest with a population of approximately 3,500 residents. The nearest structures to the proposed project are within 500 feet of the lower reservoir footprint but these structures are part of the decommissioned smelter plant and are not in use (Tetra Tech et al. 2021). Existing noise and vibration conditions in the study area are expected to be within the range for a rural area, with periodic louder noise intrusions from railway traffic on the BNSF railroad or overhead airplanes.

Former CGA Smelter Site Cleanup

The former CGA smelter site encompasses an approximately 350-acre area within and east of the proposed lower reservoir. Aluminum smelter construction began in 1969 and the site was operated as a

smelter from 1971 to 2003. Demolition of all buildings directly associated with the smelter began in 2011 and was completed in 2013. The principal contaminants associated with the aluminum production process include polycyclic aromatic hydrocarbons (PAHs), fluoride, and cyanide salts. However, wastes generated by the facility also included elevated concentrations of sulfate, sodium, and other metals.

Ecology is currently administering a process for the potentially liable parties for the CGA smelter cleanup site—NSC Smelter LLC (property owner) and Lockheed Martin Corporation (former property owner and operator)—to design and implement a cleanup action.

The existing groundwater in the uppermost aquifer is contaminated in the proposed lower reservoir area, in Area of Concern 2. One SWMU, the WSI (SWMU 4), is located within the proposed project footprint, overlapping a portion of the proposed lower reservoir footprint, as shown in Figure 4.10-1. SWMUs 13 and 19 are also near the proposed lower reservoir area. Ecology also identified a ditch on the southern side of SWMU 13 as an additional area for investigation (Tetra Tech et al. 2021). These areas are summarized as follows:

Former CGA Smelter Site Areas

A 2014 Agreed Order between Ecology and the potentially liable parties for the former CGA smelter cleanup site defines the following terms:

- **Area of Concern:** Refers to any area of the facility where a release of dangerous constituents (including dangerous waste and hazardous substances) has occurred, is occurring, is suspected to have occurred, or threatens to occur.
- **Solid Waste Management Unit (SWMU):** Refers to any discernible location where solid wastes have been placed at any time, irrespective of whether the location was intended for the management of solid or dangerous waste.

- **SWMU 4: West Surface Impoundment.** An approximately 10-acre limited purpose landfill, constructed in 1981. The landfill excavation was lined with 6 inches of sand and a geosynthetic underliner. The WSI operated as an impoundment for approximately 89,000 cubic yards of the following industrial wastes generated from the smelter operations until 2003:
  - Sludge from plant air pollution control process (originally designated as a state-only dangerous waste under WAC 173.303 until the regulation was revised in 1995
  - Basement cleanup and cell line sweepings
  - Dormer dust
  - Paving cleanup
  - Sludge from auto shop wash station
  - Sludge from paste plant cooling water
  - Cleanup soil from paste plant
  - Filter cake

  In 2004, the WSI was closed in accordance with federal Resource Conservation and Recovery Act requirements using a geosynthetic landfill closure/cap with drainage layer and 2-foot soil cover. The closure also involved installing a ventilation system below the liner system that leads to three vertical ventilation pipes. The WSI remains enrolled in a long-term operations, maintenance, and monitoring program, including groundwater monitoring for chemicals that have been detected above established numerical screening levels. The groundwater monitoring network consists of 16 monitoring wells that monitor different depth intervals.

  Contaminants of concern associated with SWMU 4 include sulfate, chloride, fluoride, and cyanide. Of these, sulfate is the primary contaminant present in groundwater associated with the WSI. The groundwater cleanup level for sulfate is the state drinking water standard based on aesthetics (e.g., taste, color, or smell of the water) and not toxicity to humans or animals. While the WSI was in operation, leakage through the underliner likely created the plume of sulfate.

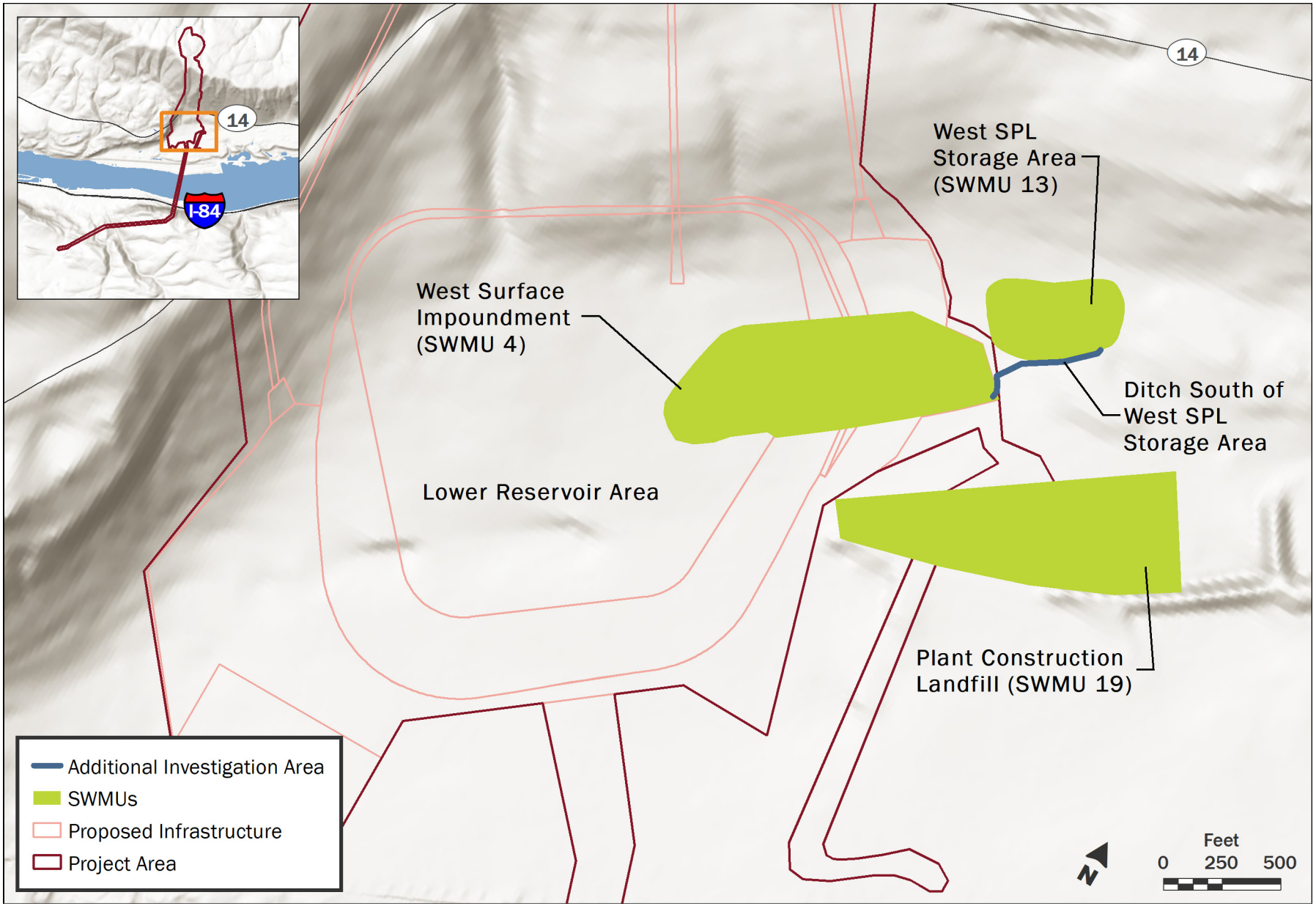
However, the post-closure groundwater monitoring suggests that the closure has been generally effective in reducing contaminant leaching from the WSI wastes to the underlying groundwater.

- **SWMU 13: West Spent Pot Liner Storage Area**. This area, immediately northeast of the proposed project's lower reservoir, operated as a storage area for spent pot liner until it was closed using an engineered cap in 1988, under the state solid waste regulations at the time (WAC 173.304). During operation of this unit during the 1980s, the spent pot liner was not a listed hazardous waste and was handled at the plant as a solid waste. However, spent pot liner is currently a listed hazardous waste (K088) due to their content of cyanide salts. Long-term operations, maintenance, and monitoring consisting of groundwater monitoring for SWMU 13 was performed between 1990 and 2008 until the responsible party filed for bankruptcy protections. Contaminants of concern associated with SWMU 13 include sulfate, chloride, fluoride, cyanide, and sodium. It is likely that leaching of the spent pot liner by precipitation prior to closure of SWMU 13 was the source of most of the fluoride contamination now observed in groundwater in the study area.

- **Ditch South of West Spent Pot Liner Storage Area**. A ditch running along the south edge of SWMU 13 was historically unlined and contained the scrubber slurry line leading from the aluminum plant to the WSI. There is evidence that, during the two decades that the WSI was in operation, the sludge lines or other potential sources released contaminants to the unlined ditch, which may have locally affected groundwater quality. The southern ditch was repaired and modified in 1996 and again in 1997 including regrading, lining it with a geosynthetic liner, and covering it with crushed rock (Tetra Tech et al. 2021). This area was further characterized in recent Remedial Investigation documents (Tetra Tech et. al. 2020, 2021). The primary contaminants of concern associated with the ditch are PAHs and fluoride.

- **SWMU 19: Plant Construction Landfill**. During construction of the smelter in 1969 to 1970, the construction contractor reportedly disposed of general debris in this area, which is east-southeast of the proposed lower reservoir. An existing access road that would be used for construction access during the proposed project runs across this SWMU. No records of specific quantities or types of materials disposed in this area are available. However, a geotechnical investigation conducted in 2001 found that this SWMU contained primarily basalt cobbles and gravel interpreted to have been derived from initial plant blasting and grading activities. There are no contaminants of concern specifically identified for SWMU 19.

Figure 4.10 1
Solid Waste Management Units Within and Adjacent to Proposed Lower Reservoir Area



Data Sources: FFP 2021a, 2021b

The Applicant is in consultation with Ecology and the Washington State Attorney General's Office regarding entering into a Prospective Purchaser Agreement to complete remediation for a portion of the former CGA smelter cleanup site—namely, full removal of the WSI (SWMU 4). If approved, the Prospective Purchaser Agreement would be implemented and enforced by means of a prospective purchaser consent decree between the state and the Applicant. The Applicant and Ecology will continue work to develop the cleanup action plan and negotiate a prospective purchaser consent decree under which the Applicant would complete the necessary remediation work. This would be subject to public comment consistent with MTCA requirements, FERC issuing a license for the proposed project, and the Applicant exercising an option to purchase the land required to complete the proposed project.

The Applicant's proposed cleanup action would involve removal of the WSI, including all of the waste, the cap/cover, underliner, and piping systems, and some depth of underlying soils, to allow subsequent construction of the proposed lower reservoir. The Applicant estimates that 145,550 in-place cubic yards of materials would need to be removed, separated into the following components:

- Engineered Resource Conservation and Recovery Act cover system: 40,350 cubic yards
- Waste material disposed in the WSI: 89,000 cubic yards
- Liner system: 16,200 cubic yards

To the extent practical, the vegetative cover material would be reused on site if it complies with applicable MTCA cleanup standards. This would only occur for portions of the vegetative cover that are not in contact with the WSI wastes. The remaining components of the Resource Conservation and Recovery Act cover system, the waste material and the liner components below the waste material, would be transported off site for landfill disposal as a non-dangerous waste material. For purposes of this analysis, it is assumed that the entire 145,550 cubic yards of removed material would be landfilled off site.

4.10.1 How Impacts Were Analyzed

Analysis related to hazardous substances within the smelter cleanup site was based on documentation provided by the Applicant or generated by the CGA smelter cleanup process. The analysis included no additional data collection or modeling.

Dam safety-related risks to public safety were evaluated qualitatively for both reservoirs considering design information provided by the Applicant and based on the size, operation classification, and location of each reservoir.

The Applicant's predicted levels of noise and vibration in construction and operation were qualitatively and quantitatively assessed. Quantitative assessment was performed using the Federal Highway Administration online noise model (FHWA 2006).

Factors considered for the evaluation of potential effects of the proposed project on study area environmental health resources included the following:

- Reservoir damage, breach, or failure: threats to human health and safety or the ecological environment
- Release of contaminants to the environment: harm to people or ecological receptors (e.g., fish and wildlife) resulting from release of contaminants
- Physical safety risks: threats to the safety of workers or the public
- Noise and vibration: noise and vibration levels relative to applicable regulatory standards and the potential to disturb or harm people or wildlife

4.10.2 Findings for the Proposed Project

4.10.2.1 Impacts from Construction

Reservoir Damage, Breach, or Failure

There would be no potential for impacts resulting from damage, breach, or failure of the reservoir embankments until the reservoirs are filled with water. The initial fill of the system would occur over an estimated 6-month period near the end of the construction period. Therefore, impacts related to the potential for reservoir damage, breach, or failure are discussed as impacts from operation in Section 4.10.2.2.

Release of Contaminants to the Environment

During proposed earthwork activities in the lower reservoir area, there would be a potential for release of toxic/hazardous materials to the environment. This could result from disturbance to existing contaminated materials within the former CGA smelter cleanup site, specifically the planned removal of the WSI (SWMU 4). The planned complete removal of the WSI, conducted in accordance with MTCA, would involve handling and removal from the site of 89,000 cubic yards of contaminated waste material and 56,550 cubic yards of additional materials comprising the WSI.

The WSI removal action would occur near contaminated materials present in the capped SWMU 13 West Spent Pot Liner Storage Area and the ditch south of SWMU 13. It would also occur near SWMU 19, the Plant Construction Landfill, for which there has been no evidence reported of contaminated materials. The proposed project footprint does not include work in these three nearby areas. It is assumed that the proposed project construction, including removal of the WSI, would not affect them.

The disturbance and direct handling of contaminated materials in the WSI, including disturbance from support/staging activities outside of an excavation zone, creates the potential for unintended releases of those contaminants into the environment within the cleanup area. However, the potential for such releases to adversely impact the environment is minimized by planning and conducting the action in accordance with the MTCA requirements developed specifically to conduct such work. Under the terms of the prospective purchaser consent decree, the Applicant would implement the cleanup action plan. This would include Ecology oversight of the remedial actions, including approval of the cleanup engineering design report, confirmation monitoring, and compliance monitoring.

Potential temporary impacts to environmental health during construction would be limited to spills or fugitive migration of contaminated soils (as dust) or contaminated stormwater during removal of the WSI. In addition, construction workers may contact contaminated materials including spills of hazardous materials used during construction (e.g., fuels), or fugitive dust and gasses from the WSI. The project area is relatively close to landfills in Roosevelt, Washington, and Arlington, Oregon. Both are permitted to accept the waste that would be excavated from the WSI area. This would minimize risk associated with transporting the waste to the disposal facility.

Implementation of the cleanup would include BMPs for temporary erosion and sedimentation control, dust control, and prevention of spills of hazardous materials (e.g., fuels) used during construction. They would also help to prevent track out and deposition of contaminated materials outside of the project footprint, in accordance with Ecology-approved remediation plans. Workers conducting the remediation work would have training in hazardous waste operations, and work under the requirements of a site-specific health and safety plan to control/limit worker exposure, in accordance with the requirements of WAC 296.843 Hazardous Waste Operations.

Construction stormwater from the cleanup activities would be managed in accordance with a Construction Stormwater General Permit. The permit could include a site-specific Administrative Order because contaminated materials would be handled. The Administrative Order would require preparation and implementation of a Stormwater Pollution Prevention Plan and capture and treatment of contaminated stormwater (and dewatering water if generated) prior to discharge. It would also establish indicator levels for known contaminants of concern at the cleanup site and require rigorous monitoring and reporting to Ecology to ensure that all water discharged to receiving waters complies with the indicator levels. It would also include requirements regarding the handling of contaminated materials. If Ecology defines an allowable discharge for the contaminants of concern associated with the WSI cleanup action prior to their issuance of a Section 401 water quality certification decision for the proposed project, Ecology may choose to address the handling of contaminated stormwater and material in the Section 401 water quality certification instead of a site-specific Administrative Order.

The *Surface and Groundwater Hydrology Resource Analysis Report* (Appendix B) proposes preparation of a Construction Water Resource Monitoring and Response Plan as a mitigation measure. This Plan would be implemented during construction and would provide an integrated program to monitor water quantity (hydrology) and water quality for groundwater and surface water. It would also define metrics for determining the presence and degree of impact. The proposed Plan would likely be prepared independent of the proposed WSI removal action under MTCA, but it may overlap with MTCA monitoring requirements (e.g., share monitoring locations) to achieve a comprehensive and efficient program overall.

Full removal of contamination is a permanent and high-preference cleanup action under MTCA. In this case, completing the proposed WSI removal would permanently remove a large quantity of contaminated materials from the former CGA smelter site that, if left in place, would require long-term maintenance of the containment features. If left in place, the contaminated materials would also represent a potential risk to human health and the environment via leaching to groundwater or direct contact (by humans or wildlife) or dispersal by erosion if the materials were to become exposed in the future.

Through compliance with required control measures, monitoring programs, and Ecology-approved remediation plans and required permits, any potential temporary release of contaminants to the environment would not result in a significant adverse impact.

Physical Safety Risks

Given the isolated location of the proposed project, the potential temporary impacts to human physical safety resulting from its construction would include worker injury, work-related traffic accidents, and increased potential for starting wildfires. The construction contractor would be required by the Applicant to create and implement a written Accident Prevention Program applicable to the safety hazards found in their workplace. In addition, training on-site workers in construction safety protocols, equipment operations, driver safety, and ergonomic practices specific to the work, and providing task-specific personal protective equipment would reduce risk for worker injury.

Given the arid nature of the proposed project area, it is prone to risk of wildfires particularly due to ignition sources that may be present and used during construction. Clearing and grubbing the construction area, including staging areas, to remove vegetation would limit the supply of fuel for fire to start. However, the brush and other vegetative materials ("slash") removed by clearing and grubbing of the large construction footprint would need to be managed to reduce potential fuel for a wildfire. The management methods could include hauling the slash to an off-site composting facility, burning it on site in a controlled manner subject to Klickitat County open-burn requirements, or mulching it on site.

Robust dust control measures would be required by Ecology (see Sections 4.3.2.3 and 4.10.2.3) to limit fugitive dust emissions during the large-scale earthwork and aggregate processing activities. Dust control measures employing water—via water trucks, sprinklers, misters/foggers, etc.—would also reduce risk for wildfires.

With appropriate worker safety training and best practices in place, the potential temporary construction-related risks to physical safety would not result in a significant adverse impact.

Noise and Vibration

Completing the earthwork construction elements of the proposed project would create temporary noise and ground-borne vibrations. The noise and vibration effects would primarily be the result of the following activities:

- Large-scale excavation and blasting to construct the reservoirs
- Operation of aggregate processing and concrete batch plants
- Reservoir embankment placement/compaction
- Blasting and tunneling to construct the underground powerhouse and conveyance system (e.g., piping, pumps, penstock, and power turbines)
- Truck traffic to and from the construction site

The highest noise level from construction activities was estimated to have a maximum sound level (L_{max}) of 61.5 dBA at approximately 0.4 mile away, which is the distance to the single reported residence near the lower reservoir construction area. For comparison, normally acceptable maximum sound levels in rural areas such as the study area range from 55 to 60 dBA L_{max} (WAC 173.60.040) and these areas may experience regular noise intrusions from road and airplane traffic ranging from 45 to 72 dBA (WSDOT 2020), or passing trains may create temporary noise up to 90 dB (USDOT 1982).

Noise Terminology

dBA: Noise is usually measured in decibels (dB) on the A-weighted scale (dBA), which corresponds to how humans hear sound.

Maximum Sound Level (L_{max}): The highest sound level measured during a single noise event (e.g., a hammer strike or quarry blast).

There are no homes in or immediately adjacent to the proposed project area. The scattered farm residences west and north of the northern extent of the proposed project and the single reported residence 0.4 mile away from the lower reservoir area would experience some increased noise during construction but would be sheltered from some noise by vegetation, hills, and distance. Canyon-shaped areas could cause some noise to be reflected.

Additional truck round trips would cause an increase in noise compared to existing conditions, but the anticipated access road routes are located in mainly rural, unpopulated areas with very few people who could be affected. Workers in the construction area would experience higher noise levels, but they would wear hearing protection to minimize the impacts of noise.

Vibration from construction is not expected to affect any nearby structures. To reduce the effects of construction vibration on wind turbines, the Applicant intends to implement BMPs that include a construction vibration monitoring program, with definition of vibration criteria, to ensure there is no damage to those existing wind farm facilities and no interruptions to their operation (FFP 2020a).

Impacts to wildlife from construction noise and vibration are discussed in the *Terrestrial Species and Habitats Resource Analysis Report* (Appendix G) and the *Aquatic Species and Habitats Resource Analysis Report* (Appendix F).

With appropriate control measures and monitoring programs in place and as required by permits, the temporary construction-related noise and vibration effects would not result in a significant impact.

4.10.2.2 Impacts from Operation

Reservoir Damage, Breach, or Failure

Operation of the proposed upper and lower reservoirs presents some degree of risk to environmental health due to the potential risk of damage, breach, or failure (e.g., due to an earthquake) that could create a gap in the reservoirs' concrete-faced rockfill embankment. This could then result in a release of impounded water. The degree of impact could range from low-volume seepage through the reservoir's liner system to the unlikely scenario of catastrophic failure of a reservoir embankment. Seepage is expected to be negligible (see Section 4.2). Therefore, impacts due to the potential for a breach or failure are the focus of this analysis.

Breaches of either of the reservoirs' large above-grade embankments (175 feet high for upper reservoir, 205 feet high for lower reservoir) would release water that would be expected to flow down the outer face of the embankment. For low rates of discharge, water would infiltrate to shallow groundwater, and for higher rates of discharges that overwhelm the surrounding soils' infiltration capacity, the runoff would be stormwater.

Because the water quality within the reservoirs is expected to degrade gradually as operations proceed (see Section 4.2), a small discharge of water from a breached embankment could adversely impact the quality of groundwater adjacent to the breach location. In the area surrounding the upper reservoir, shallow and disconnected groundwater conditions would not result in a significant adverse impact to water quality. In the area surrounding the lower reservoir, the existing groundwater is contaminated (Area of Concern 2). Therefore, in the event of a low-volume discharge from a breach of the lower reservoir, the primary impact would be temporarily altered flow direction of the existing contaminated groundwater.

A higher-volume discharge from a larger breach of an embankment would be expected to runoff to adjacent intermittent stream channels, eventually flowing into Swale Creek from the upper reservoir area or the Columbia River from the lower reservoir area. In either location, the degree of impact would depend on the rate of discharge entering a surface waterbody. High rates of breach discharge would scour and erode surface soils adjacent and downstream of the breach, delivering high levels of suspended solids (turbidity) to the receiving waters that, depending on specific conditions, could constitute a significant impact even if temporary. Depending on where in the lower reservoir embankment a large breach might occur, the erosion may entrain and transport contaminated surface soils associated with the historical smelter operations, which could result in a significant water quality impact to the Columbia River.

Each reservoir is proposed to have an active storage capacity of approximately 7,100 acre-feet of water. While design of the proposed project is currently preliminary, the reservoirs would be designed to include extra capacity to accommodate maximum precipitation events and over-pumping events as well as monitoring instrumentation and equipment to prevent reservoir overtopping (HDR 2020a). In the improbable event of a failure of either reservoir's embankment, the discharge would be expected to cause severe downstream erosion and water quality impacts to receiving waters. Such a release would also pose an acute physical safety threat to persons working in the immediate vicinity of the failure.

The FERC license process is rigorous and intended to ensure that dam failure does not occur over the dam's operational lifetime. Prior to the start of project construction, FERC must review and approve the licensee's Construction Quality Control Inspection Program. Inspections are required during dam construction to ensure the licensee's engineer is properly implementing the construction inspection plan. The licensee is also responsible for providing periodic and final construction reports to FERC.

Following construction, an independent consulting engineer approved by FERC must inspect and evaluate the dams every 5 years. The engineering inspections must examine dam safety deficiencies, project construction and operation, and safety concerns related to natural hazards including seismic events. Should an inspection identify a deficiency, FERC would require the licensee to submit a plan and schedule to remediate the deficiency. FERC would then review, approve, and monitor the corrective actions until the licensees have satisfactorily addressed the deficiency. The Applicant has included installation of monitoring and surveillance equipment for each reservoir embankment to meet dam safety guidelines and facilitate inspections to ensure each embankment is performing as designed (HDR 2020a).

Under the FERC dam safety protocols, applicants for hydropower projects under FERC's jurisdiction are also required to develop and file the emergency action plan for reservoirs. As discussed in Section 4.5, Public Services and Utilities, the emergency action plan will be shared with local emergency management agencies responsible for developing community emergency response plans. The plan will include inundation maps identifying high-water areas downstream of the proposed project in the event of a catastrophic structure failure. Local jurisdictions would need to review the plan and the inundation maps and develop evacuation plans for areas downstream as needed, to prepare in the event of a failure of the structure. Information from the emergency action plan would likely be incorporated into the Klickitat County Multi-Hazard Jurisdiction Plan, which is scheduled for an update in 2025 (Klickitat County 2020).

Therefore, there would be an extremely low probability for catastrophic failure, and a low probability for a smaller breach of either reservoir embankment, because of the following:

- The engineering rigor required by the FERC licensing and approvals process
- The close oversight throughout the design and construction process
- The stringent requirements for dam surveillance and monitoring throughout operations

By obtaining FERC approval, employing appropriate design and construction protocols, and performing required inspection and monitoring throughout operation, the risk of potential damage, breach, or failure of the proposed reservoirs would not result in a significant adverse impact.

Release of Contaminants to the Environment

The potential for impacts to environmental health due to contaminant release to the environment would be greatly diminished once the proposed project is constructed and in operation.

Under the MTCA process, confirmation groundwater monitoring would be conducted following removal of the WSI to ensure the action met the cleanup objectives. This monitoring would be defined in a monitoring plan approved by Ecology and would be conducted with Ecology oversight for as long as Ecology determined it necessary. If monitoring indicated that a release to groundwater had occurred, whether from WSI removal or other activities, and that migration of the contamination posed a threat to human health or the environment, remedial response actions could be implemented under MTCA to mitigate the risk. Specifics of the remedial response actions would be defined based on the location of the release, the type of contaminant, and other considerations.

Similar to the construction period, the *Surface and Groundwater Hydrology Resource Analysis Report* (Appendix B) proposes an Operations Water Resource Monitoring and Response Plan as a mitigation measure. The proposed Plan would likely be prepared independent of the proposed WSI removal action under MTCA, but may overlap with MTCA monitoring requirements and locations, similar to the construction plan.

With appropriate monitoring programs in place, and with remedial measures available if monitoring indicated a release posing a threat, any release of contaminants to the environment from proposed project operations would not be significant.

Physical Safety Risks

The types of impacts resulting from long-term operation of the proposed project would be similar to those identified during construction, but with lower potential for worker injury and for wildfire ignition than identified for the construction period. Because of the anticipated nature of operation and maintenance work to be conducted, workers would generally be less susceptible to physical injury. Project operations should also involve limited, if any, use of ignition sources outdoors. With appropriate worker safety training and best practices in place, the risk to physical safety including wildfire ignition throughout long-term project operations would not be significant.

Noise and Vibration

Operational noise from the proposed project is expected to be negligible. There would be periodic temporary noise and vibration from the turbine-generator system, maintenance activities, periodic truck movements, and heavy tools or equipment. Impacts from noise and vibration during operation would be substantially lower than during construction because there would be much less activity. The Applicant expects that background noise levels will not be elevated beyond 500 feet from project infrastructure (FFP 2020a) and thus would not reach the nearest residences. Canyon-shaped areas could cause some noise to be reflected. An alarm system will be used to alert bystanders to the start of pumping from one reservoir to the other. This will create a short-term local noise that would mainly affect project workers but will be an important safety feature and should not be mitigated (FFP 2020a).

The Applicant indicated they will minimize noise impacts through measures proposed in their draft WMP (FFP 2020c) to protect the rural setting that currently exists in the Columbia Gorge (see Section 4.7). Because of the rural location of the study area, no specific mitigation is proposed to reduce noise and vibration during operation. Impacts from operational noise would not be significant.

4.10.2.3 Proposed Mitigation Measures

No mitigation measures would be required because there would be no significant adverse impacts. Specific permit conditions and mitigation actions would be confirmed by regulatory agencies during permitting for the proposed project and implemented as part of the required permits or plans. Permits with conditions related to environmental health are likely to include the Construction Stormwater General Permit with a project-specific Administrative Order for the proposed cleanup action, the Industrial Stormwater General Permit, the Section 401 Water Quality Certification, and the FERC hydropower license that would include design, construction, planning, and monitoring requirements in accordance with FERC dam safety protocols.

Relevant Mitigation Measures in Other Sections

Although not required to reduce any significant adverse impacts, implementation of mitigation proposed in other sections of this EIS would also further reduce potential impacts to environmental health.

The following is a brief summary of relevant Ecology-proposed water resource mitigation measures; Section 4.2.2.3 and the *Surface and Groundwater Hydrology Resource Analysis Report* (Appendix B) and *Wetlands and Regulated Waters Resource Analysis Report* (Appendix C) contain complete descriptions of these measures:

- **Construction Water Resource Monitoring and Response Plan.** This mitigation measure for the protection of water quantity and water quality during construction would also protect environmental health (see Section 4.2).
- **Operations Water Resource Monitoring and Response Plan.** This mitigation measure for the protection of water quantity and water quality during operations would also protect environmental health (see Section 4.2).

The following is a brief summary of relevant Ecology-proposed air quality and GHG mitigation measures; Section 4.3.2.3 and the *Air Quality and Greenhouse Gases Resource Analysis Report* (Appendix D) contain complete descriptions of these measures:

- **Use of Best Management Practices During Construction.** Proposed strategies to reduce fugitive dust would also further reduce potential impacts to environmental health. These measures include spraying soil with water, minimizing idling of equipment, covering material piles, sweeping, installation of dust collectors, applying dust suppressant, or timing construction to avoid high winds (see Section 4.3).

The following is a brief summary of an Applicant-proposed mitigation measure to reduce impacts on terrestrial species and habitats; a summary of the WMP is provided in Section 4.7.2.3 and the *Terrestrial Species and Habitats Resource Analysis Report* (Appendix G):

- **The Applicant's Draft Wildlife Management Plan.** The Applicant proposed several mitigation measures to reduce impacts on terrestrial habitat and species in their draft WMP (FFP 2020c). Measures in the WMP that would also further reduce potential impacts to environmental health include the noise control measures that would include conducting high noise activities simultaneously when feasible and equipping noisy equipment with noise control features when possible (see Section 4.7).

4.10.2.4 Significant and Unavoidable Adverse Impacts

Through compliance with laws, obtaining FERC approval, employing appropriate design and construction protocols, performing required inspection and monitoring throughout operation, and implementation of the mitigation measures described in Section 4.10.2.3, there would be no significant adverse impacts related to environmental health from construction or operation of the proposed project.

4.10.3 Findings for the No Action Alternative

In the No Action Alternative, the proposed project facilities would not be constructed. Investigation of contamination and development of cleanup actions for the CGA smelter site would continue through the separate MTCA cleanup process under Ecology oversight. In the absence of the proposed project fully removing the WSI, it is unknown what cleanup action would be required for the WSI through the full site's MTCA cleanup process, which is underway. Under the MTCA process, a feasibility study would evaluate alternatives to address the contaminant impacts associated with all areas of the site including groundwater impacts associated with the WSI. Using that information, Ecology would then select the cleanup alternative for the entire site, including the WSI, that is permanent to the maximum extent practicable as defined by MTCA. Ecology would present their proposed decision in their cleanup action plan for the entire site, which would then be subject to public review and comment.

For the purposes of evaluating the No Action Alternative, it is assumed that the MTCA disproportionate cost analysis conducted as part of the feasibility study would likely conclude that the incremental cost to fully remove the WSI would be greater than the incremental environmental benefit achieved relative to the continued containment, inspection, and monitoring of the WSI.

These assumptions are consistent with Ecology's April 2020 response to the Applicant's application for a prospective purchaser consent decree that states "It also appears that the proposed project would bring new resources to the cleanup of the CGA smelter site and result in a more complete cleanup by removing the entire WSI (SWMU 4) for off-site disposal" (Ecology 2020). Therefore, under the No Action Alternative, it is assumed that the WSI would remain intact and continue to be monitored and maintained under the existing closure plan. Contaminated waste materials are assumed to remain within the former CGA smelter cleanup site, serving as a potential long-term source of groundwater contamination. However, the WSI would remain within the ongoing MTCA cleanup process for the smelter site and could be subject to additional remedial actions potentially requiring long-term stewardship measures, monitoring, and land-use restrictions that would be expected to be part of the cleanup plan.

Overall, there would be no significant adverse impacts to environmental health under the No Action Alternative.

4.11 Land Use

The term "land use" refers to how land is developed for various human uses or preserved for natural purposes. This section describes the current land use conditions in the study area, potential changes or impacts, and mitigation measures.

The study area for land use includes areas where land uses may be impacted or altered by construction and operation of the proposed project. As such, the study area would include all lands within the boundaries of the project site.

The project area is primarily located in Klickitat County, Washington. Most of the project area is located on private lands owned by NSC Smelter, LLC (Figure 4.11-1). Project tunnels between the upper and lower reservoirs would cross under SR 14, which is owned by WSDOT. An existing access road that crosses WDNR lands would be used for accessing the upper reservoir. The proposed aboveground transmission line that would connect from the proposed substation to an existing, available circuit on BPA transmission line structures within an existing utility right-of-way would aerially cross the Columbia River to the existing BPA John Day Substation in Sherman County, Oregon, near the City of Rufus.

The project area is within the following Klickitat County zoning districts: Energy Overlay Zone, Extensive Agriculture, Industrial Park, and Open Space (Figure 4.11-2; Klickitat County 2021a).

As shown in Figure 4.11-3, the portion of the Columbia River adjacent to the project area has an existing shoreline environment designation of Urban/Industrial and Conservancy (Watershed Company 2016). Construction and operation of the proposed project would not occur within the shoreline. The project area would be adjacent to these designations but not within shoreline environmental designations, except for an overhead transmission line.

Key Findings of the Land Use Analysis

The analysis found the proposed project would have **no significant and unavoidable adverse impacts** related to land use.

Construction would temporarily change an existing land use and may temporarily impact the intended function of surrounding land uses, but would not require a modification or amendment to an existing zoning, planning, or policy document.

For proposed project operations, the area would convert from undeveloped space and previously used industrial operations with some existing infrastructure to a utility-scale pumped hydropower facility. This change would not be consistent with existing zoning because applicable zoning districts do not permit utility operations.

Mitigation is not required to reduce any significant impacts, but a conditional use permit may be required. If impacts to critical areas were to occur, the Applicant would be required to develop and implement mitigation to address the impacts.

Zoning

Zoning districts are intended to carry out the goals and policies of locally adopted comprehensive plans and establish permitted land uses and development standards. Zoning is defined within each jurisdiction's development regulations. Applications for development permits and approvals are subject to the provisions of local zoning districts and regulations.

Shorelines

The Shoreline Management Act applies to all counties and cities that have "Shorelines of the State," as defined in RCW 90.58.030. Shoreline Master Programs regulate development typically within 200 feet of jurisdictional waterbodies to be consistent with the Shoreline Management Act goals stated in RCW 90.58.020.

Critical areas are not currently mapped by Klickitat County. Critical areas within the study area can include fish and wildlife conservation areas, wetlands, geologically hazardous areas, and critical aquifer recharge areas. Potential impacts to these critical areas and mitigation are discussed in their respective EIS sections. Geologically hazardous areas are discussed in Section 4.1. Wetlands and critical aquifer recharge areas are discussed in Section 4.2. Fish and wildlife conservation areas are discussed in Sections 4.6 and 4.7.

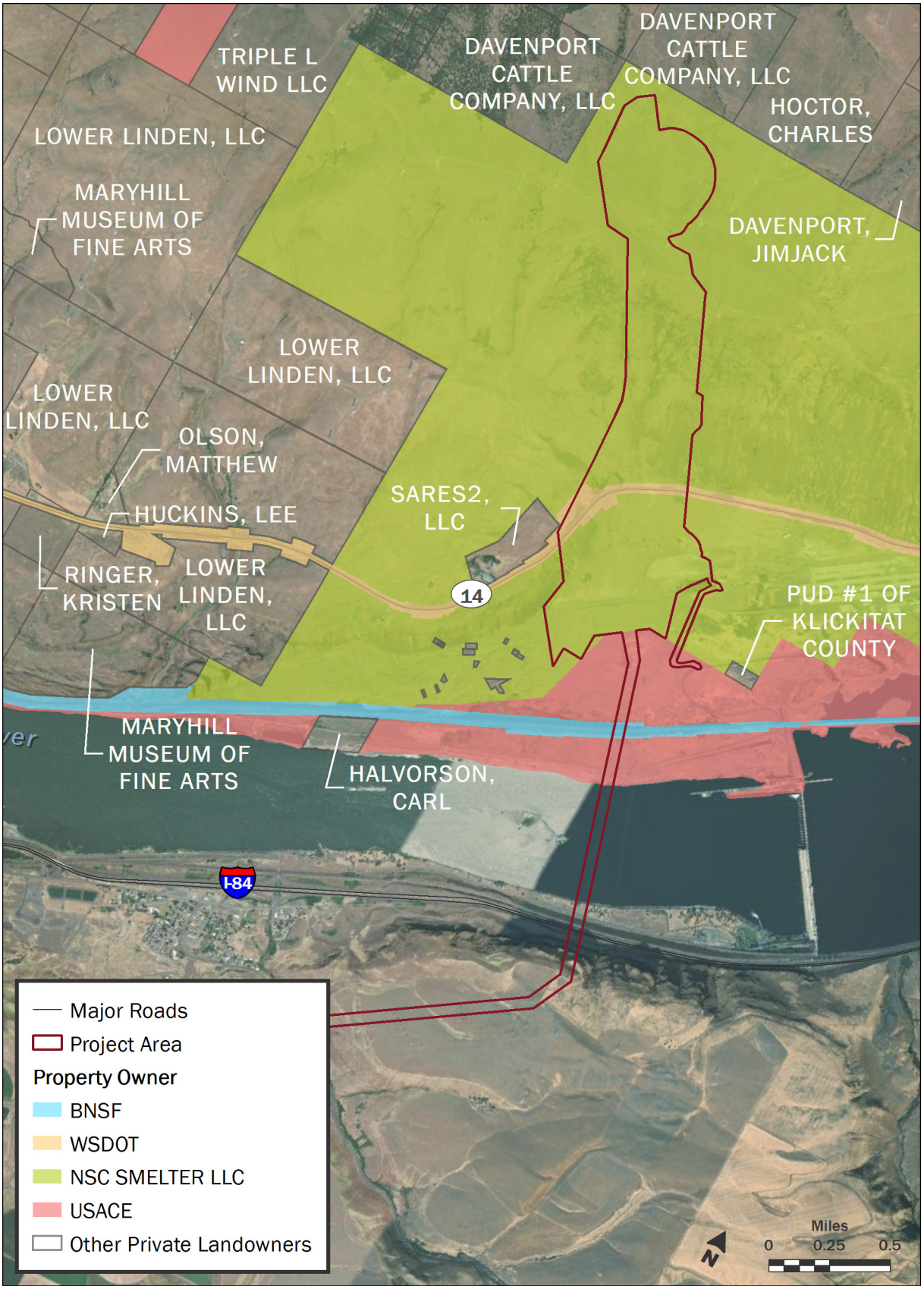
The project area is also within a Federal Emergency Management Agency designated flood hazard area, shown on Figure 4.11-3 as digitized by Ecology (Washington Geospatial Open Data Portal 2021).

Critical Areas

Critical areas are environmentally sensitive natural resources areas that are designated for protection by the Growth Management Act.

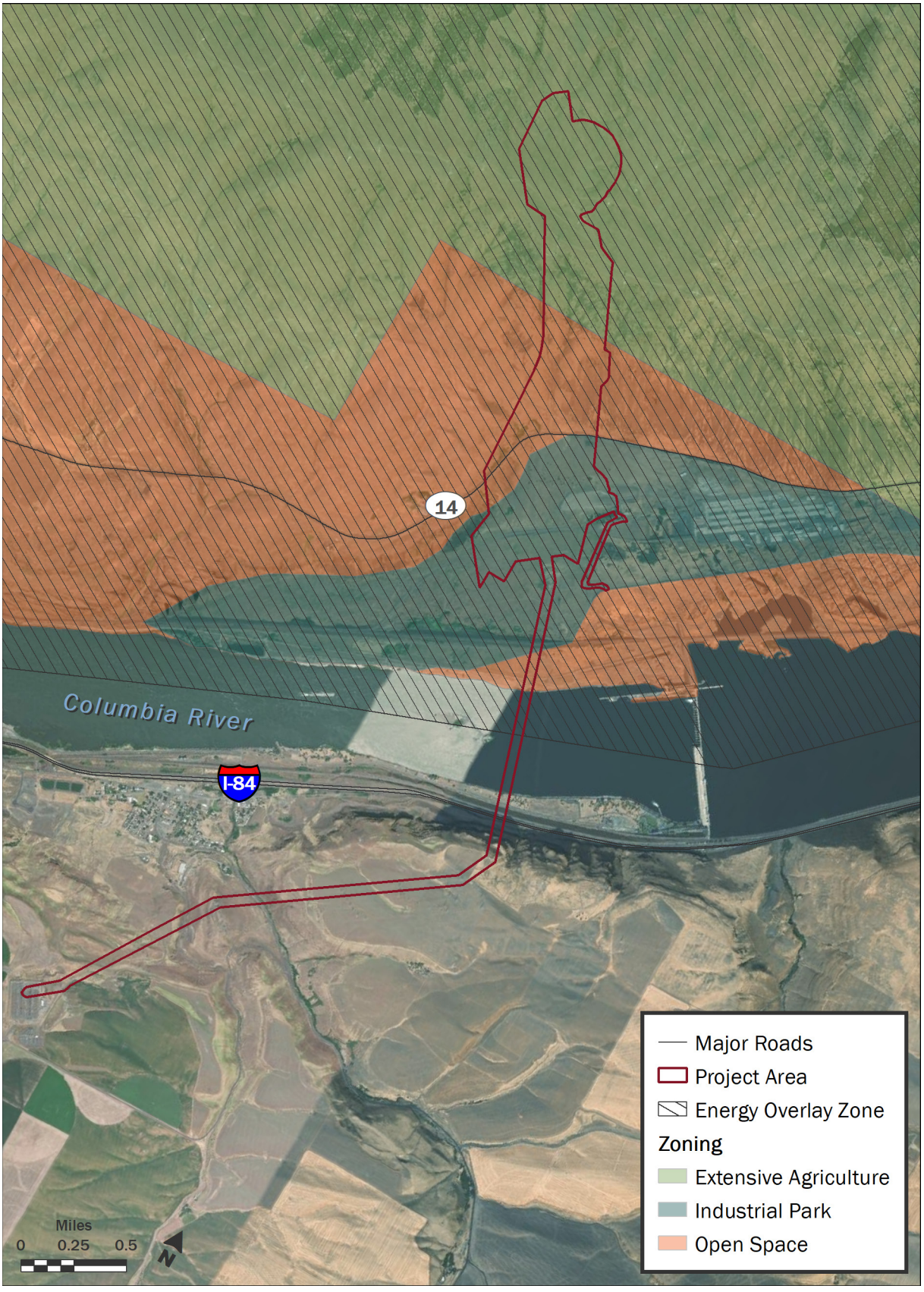
The Growth Management Act requires jurisdictions to protect critical areas (WAC 36.70A.030[5]). This involves developing and adopting critical areas ordinances that contain development regulations to ensure their protection. Protecting critical areas preserves the ecological functions and values of the natural environment.

Figure 4.11 1
Land Ownership in the Proposed Project Area



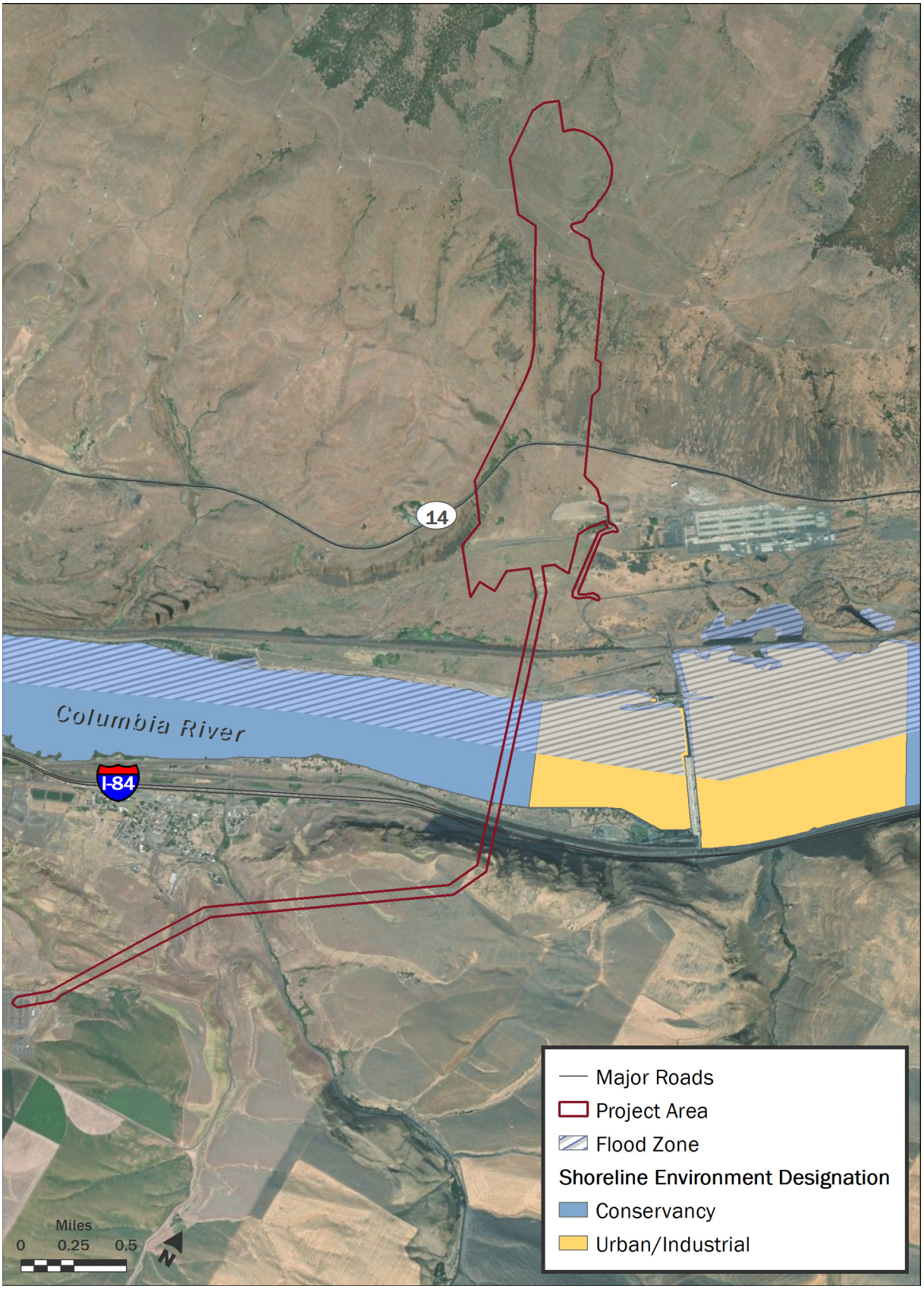
Data Source: Klickitat County 2021a, 2021d

Figure 4.11 2
Zoning Designations



Data Source: Klickitat County 2021a

Figure 4.11 3
Land Use Designations



Data Sources: Washington Geospatial Open Data Portal 2021; Watershed Company 2016

4.11.1 How Impacts Were Analyzed

Land use information within the study area was identified by using information provided by the Applicant, Klickitat County plans and documents, the Klickitat Zoning Ordinance (Klickitat County 2018), aerial photographs, and Klickitat County GIS data. Local land use plans and policies and development regulations were evaluated to assess consistency with the proposed project and the degree of probable adverse impact. These included the Shoreline Master Program, critical area requirements, and floodplain regulations.

The analysis for impacts on land uses considered the following potential effects on local jurisdictions and their communities:

- Change of an existing land use and consistency with local zoning, planning, and policy documents
- Conversions of land uses and the effect on existing land use, businesses, economies, communities, and environment
- Restrictions or changes to land use as a result of implementation of the alternatives

This analysis assumed that a significant adverse impact would occur if the proposed project would:

- Change an existing land use and would not be consistent with existing zoning, planning, and policy documents, requiring a modification or amendment to an existing plan or policy
- Convert an existing land use and would not be compatible with existing and surrounding land uses and would permanently and/or negatively impact the function of those land uses

4.11.2 Findings for the Proposed Project

4.11.2.1 Impacts from Construction

Land Use Conflicts

The project area encompasses 681.6 acres, of which 621.9 acres are private lands, including those owned by NSC Smelter, LLC. Construction of the proposed project would primarily occur on private lands owned by NSC Smelter, LLC. Other landowners within the project area include WSDOT, WDNR, BNSF Railway company, USACE, and other private landowners. Project tunnels would be located between the upper and lower reservoirs, and between the lower reservoir and the underground powerhouse. These tunnels would cross under SR 14, which is owned by WSDOT. Because these tunnels would exist below the ground surface, there would be no impacts on WSDOT land. An existing access road that crosses WDNR lands would be used for accessing the upper reservoir. No construction would occur on WDNR lands. The proposed aerial transmission line to the south would cross over USACE land and any work required to site this transmission line would occur within an existing BPA right-of-way. The Applicant would be required to comply with all WSDOT, WDNR, USACE, and BPA regulations during construction.

The project area is within Klickitat County's Energy Overlay Zone. The intent of the Energy Overlay Zone is to encourage development in locations that use the County's existing energy resources and infrastructure and to site projects in a way to reduce environmental impacts (Anchor Environmental 2004). Projects within the Energy Overlay Zone still must obtain all necessary federal, state, and local approvals and permits prior to starting construction (FFP 2020a). Construction would not occur until after all of the required approvals and permits have been obtained and issued, and construction activities would be consistent with existing zoning, planning, or policy documents. Changes in land use related to construction would be limited to the 5- year construction period and would not conflict with any existing land uses on or near the project area.

If impacts to critical areas within the project area occurred during construction, these impacts would need to be avoided, minimized, reduced, or compensated for, consistent with Klickitat County's Critical Areas Ordinance. As mentioned above, any impacts and mitigation related to critical areas are described in Sections 4.1, 4.2, 4.6, and 4.7.

Construction of the proposed project would temporarily change an existing land use, but would not require a modification or amendment to an existing zoning, planning, or policy document. Therefore, there would be no significant adverse impact related to land use conflicts during construction.

Land Use Conversion Compatibility

As mentioned previously, construction would not occur until all necessary federal, state, and local approvals and permits are obtained by the Applicant. Construction activities occurring at the project area would not result in land use changes but could temporarily impact the intended function of surrounding land uses by resulting in additional traffic, traffic delays, or traffic detours. Transportation impacts are discussed further in Section 4.13.

Construction of the proposed project would not convert an existing land use, although it may temporarily impact the intended function of surrounding land uses. Therefore, there would be no significant adverse impact related to land use conversion compatibility during construction.

4.11.2.2 Impacts from Operation

Land Use Conflicts

Once construction is completed and operations begin, land uses within the project area would be changed. The project area would convert from undeveloped space and previously used industrial operations with some existing infrastructure to a utility-scale pumped hydropower facility.

Because the project area is within the County's Energy Overlay Zone, the proposed project would be consistent with the Energy Overlay Zone's purpose of siting energy projects in areas with existing infrastructure and locations that can be sensitively managed. The proposed project would support the generation of renewable energy resources, consistent with the purpose of the Energy Overlay Zone.

As shown in Figure 4.11-2, the lower reservoir area is currently zoned as Industrial Park, the upper reservoir area is primarily zoned as Extensive Agriculture, and lands between the upper and lower reservoirs are zoned as Open Space. The Open Space, Extensive Agriculture, and Industrial Park districts do not permit utility operations as permitted use but could be accepted as a conditional use (Klickitat County 2018). Permitted uses within the Energy Overlay Zone include wind turbines, solar energy facilities, and accessory and temporary uses (Klickitat County 2018). This change in land from existing uses to utility operations would not be consistent with existing zoning because applicable zoning districts do not permit utility operations as a land use and the Energy Overlay Zone does not permit pumped storage hydropower as a land use. A conditional use permit may be required.

While operation of the proposed project would not be consistent with existing zoning, a conditional use permit may be obtained. There would not be a significant adverse impact related to land use conflicts during operation.

Land Use Conversion Compatibility

The project area would convert from primarily unused open space and previously used industrial operations with some existing infrastructure to a utility-scale pumped hydropower facility.

Land use in the upper reservoir area would be converted from undeveloped open space but would not impact adjacent grazing uses or the adjacent wind farm. In the area of the proposed penstock where the proposed project would be constructed underground, the existing land surface would not change. The lower reservoir area would remain as an industrial use. The proposed project would be compatible with adjacent energy infrastructure such as existing transmission lines, substations, and wind energy infrastructure. Other adjacent land uses such as agriculture and transportation would not be impacted by operation of the proposed project.

Operation of the proposed project would convert an existing land use and would be compatible with surrounding land uses. Operation of the proposed project would not temporarily or permanently impact the intended function of surrounding land uses. Therefore, there would be no significant adverse impact related to land use conversion compatibility during operation.

4.11.2.3 Proposed Mitigation Measures

Permit-Required Mitigation Measures

Because the proposed project would not be consistent with existing zoning, the Applicant may be required to coordinate with Klickitat County to request a conditional use permit to address the inconsistency of the proposed land use within the project area. If the conditional use permitted is issued, the proposed project would be consistent with existing zoning.

Relevant Mitigation Measures in Other Sections

In addition to meeting regulatory requirements intended to minimize environmental impacts, the Applicant would be required to implement mitigation to address potential impacts to critical areas during construction and operation of the proposed project. Probable impacts on critical areas—such as geologically hazardous areas, wetlands, critical aquifer recharge areas, and fish and wildlife conservation areas—and any mitigation measures are described in Sections 4.1, 4.2, 4.6, and 4.7.

4.11.2.4 Significant and Unavoidable Adverse Impacts

The analysis found the proposed project would have no significant adverse impacts related to land use. A conditional use permit may be required. There would be no significant and unavoidable adverse impacts related to land use from construction or operation of the proposed project.

4.11.3 Findings for the No Action Alternative

Under the No Action Alternative, the proposed project facilities would not be constructed. The wind energy project and other existing energy infrastructure in the study area would continue to be operated. Investigation of contamination and development of cleanup actions for the CGA smelter site would continue through a separate MTCA cleanup process.

No significant adverse impacts related to land use would be expected from the No Action Alternative.

4.12 Recreation

Recreation provides people with the opportunity to engage with and enjoy both natural and built environments. Along the Columbia River, outdoor recreation is an important aspect of life and provides economic benefits to communities in the area. Activities in the area include recreational opportunities at parks, rivers, and other areas that allow for paragliding, fishing, boating, birdwatching, petroglyph viewing, hunting, hiking, camping, windsurfing, kiteboarding, kayaking, and other forms of recreation. This section describes existing recreational resources and opportunities in the study area and potential impacts and mitigation measures.

The study area for the recreation analysis includes areas within the project footprint, within the area used for construction, and areas for public recreational opportunities in the region. This includes Washington State, county, and national parks; scenic trails and highways; and private recreational sites located within 10 miles of the project. A 10-mile radius was chosen for the study area because most land ownership within 10 miles of the project is private lands.

Key Findings of the Recreation Analysis

The analysis found the proposed project would have **no significant and unavoidable adverse impacts** to recreation.

There are no recreational facilities within the project footprint. Construction impacts to recreational opportunities and access to facilities within 10 miles of the proposed project area would only consist of temporary and intermittent traffic and access changes.

The proposed project features would not permanently change any existing recreational facilities or access.

Mitigation is not required to reduce any significant impacts, but strategies are proposed to further reduce potential temporary impacts.

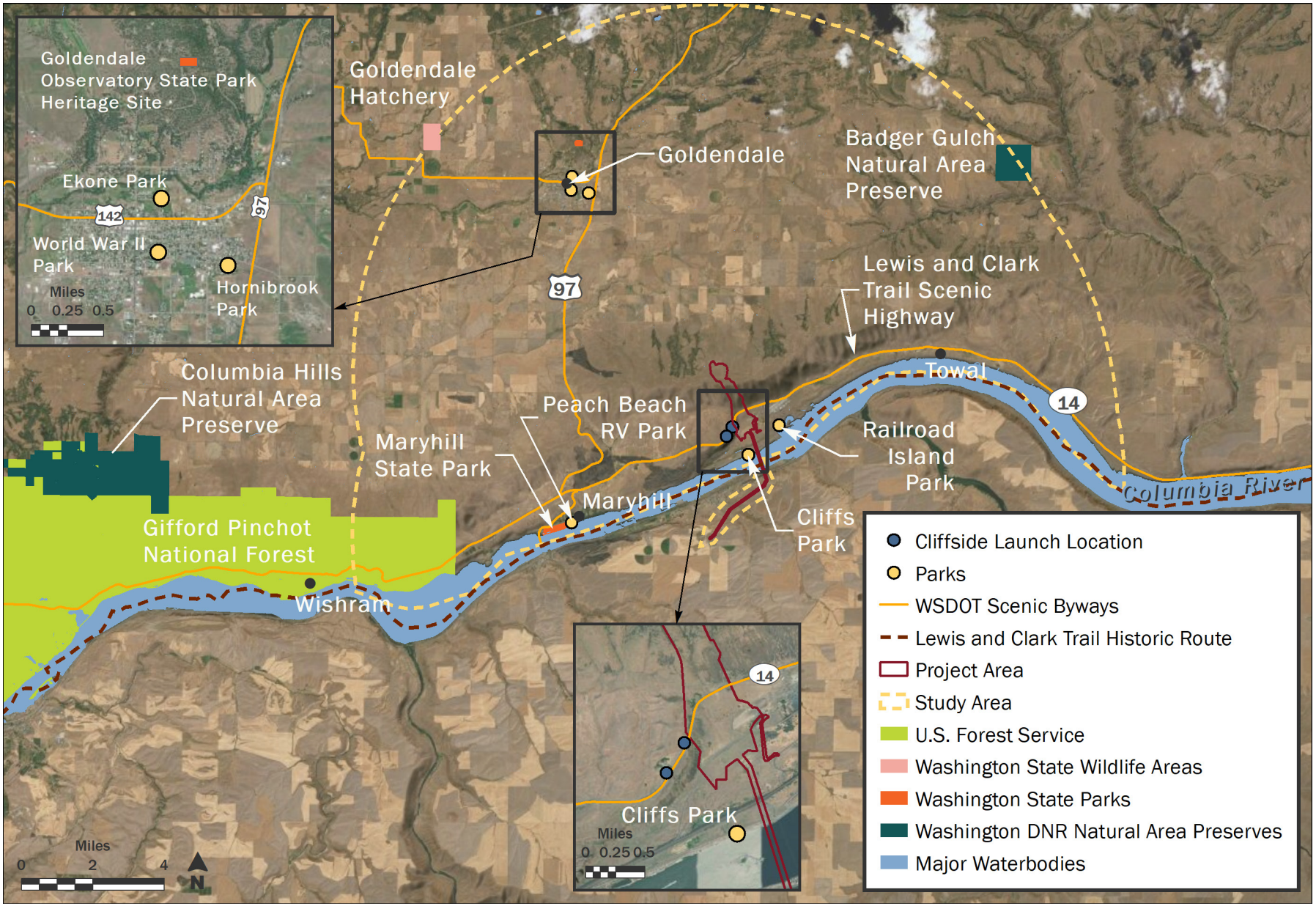
The proposed project occurs on private lands with no public recreational facilities. Recreational opportunities within the project footprint are also limited because of current and previous industrial land uses, the previous CGA smelter, and wind turbines in the upper reservoir area. Therefore, the analysis primarily looked at recreation within a 10-mile radius from the project within Washington State, shown as the study area in Figure 4.12-1. Within the 10-mile radius, there are the following parks, recreational facilities or opportunities, or public amenities:

- Columbia River and Lake Umatilla/Lake Celilo: Recreational activities that occur on the Columbia River and its reservoirs below and above John Day Dam including fishing, boating and water sports, and camping along the river.
- SR 14, the Lewis and Clark Trail Highway: Recreational opportunities along this scenic highway include viewing scenic, cultural, and historic landscapes (WSDOT 2018).
- National Historic Lewis and Clark Trail: Recreational opportunities include viewing scenic, cultural, and historic landscapes (NPS 2021).
- Maryhill State Park: Recreational opportunities include camping, picnicking, boating, fishing, and water sports, as well as access to nearby Maryhill Museum, the replica of Stonehenge by Samuel Hill and Klickitat County Veterans' Memorial, and ranger-guided viewing of pictographs and petroglyphs (WSP 2021a).
- Cliffs Park: Recreational opportunities include camping and fishing (USACE 2021).
- Railroad Island Park: Recreational opportunities include boating, picnicking, fishing, and wildlife viewing.

- Goldendale Observatory State Park: Recreational opportunities include star-gazing. The Goldendale Observatory State Park is a certified Dark Sky Park (WSP 2021b).
- Goldendale Hatchery: Recreational opportunities include fishing, hunting, and wildlife viewing (WDFW 2021i).
- Cliffside Launch: Recreational opportunities include private paraglide launching (Cascade Paragliding Club 2021).
- Gifford Pinchot National Forest: Recreational opportunities include wildlife viewing, harvesting forest products such as mushrooms and berries, fishing and hunting, camping, climbing, mountain biking, horseback riding, and hiking (USDA 2021).
- World War II Park: Recreational facilities include a tennis court, basketball court, lawn space, and playground (City of Goldendale 2021).
- Hornibrook Park: Recreational facilities at this neighborhood park include a playground area (City of Goldendale 2021).
- Ekone Park: Recreational facilities at this park include two softball fields, picnic areas, picnic tables, gazebo, playground, and stream access (City of Goldendale 2021).
- Peach Beach RV Park: Recreational opportunities include windsurfing, kiteboarding, boating, swimming, biking, fishing, and camping (Peach Beach Camp Park 2021).

The only private recreational sites within the study area are the Cliffside Launch and Peach Beach RV Park. The other sites listed above are publicly accessible facilities. Hunting for deer, waterfowl, small game, and game birds may also occur on other nearby public and private lands within the study area. Sites within the study area that allow for hunting include public areas such as the Goldendale Hatchery and Bureau of Land Management-owned lands (WDFW 2021i, 2021j).

Figure 4.12 1
Recreation Study Area and Recreational Features



Data Sources: FFP 2020a; WSDOT 2018; NPS 2021

4.12.1 How Impacts Were Analyzed

Opportunities for recreation in the study area were identified by reviewing maps, agency websites, and other information sources. For each recreational opportunity identified, information on its type and use was collected from resources such as City of Goldendale or Washington State Parks websites.

Impacts on recreation were qualitatively assessed based on how construction and operation of the proposed project and No Action Alternative could affect recreational opportunities. Each type of activity was reviewed to consider possible temporary impacts from construction, such as noise, visibility, and traffic or access changes. Activities were also analyzed for potential permanent impacts to consider whether the proposed project would reduce the quality of recreation facilities, access, or opportunities for recreation.

4.12.2 Findings for the Proposed Project

4.12.2.1 Impacts from Construction

Potential construction disturbances include noise, dust, and visibility over the 5-year construction duration; however, as there are no recreational facilities within the project area, there would be no temporary impacts from construction within the project area. The study area encompasses a 10-mile radius from the project site and includes the 14 private and publicly accessible recreational opportunities discussed previously. Temporary construction disturbances may impact a number of recreational facilities within the study area, as follows:

- Noise, dust, and visibility: Construction activities may temporarily affect parks and recreational users directly adjacent to the project area. Noise and dust may temporarily disturb users at Cliffs Park, Railroad Island Park, and Cliffside Launch because these recreational areas are within 1 mile of project construction. Dust could affect visibility for the paragliders at Cliffside Launch and dust and noise may disturb campers or other park users at Cliffs Park and Railroad Island Park along the Columbia River.

- Traffic: Throughout the 5-year duration of construction, there may be traffic delays that would affect travelers along SR 14, U.S. Route 97, and Interstate 84. SR 14 and Hoctor Road could be subject to detours during construction of the proposed project. These delays and detours may cause short-term impacts to travelers to Maryhill State Park, Cliffs Park, Railroad Island Park, Cliffside Launch, and the Gifford Pinchot National Forest. Recreational opportunities that may be impacted at these sites include camping, picnicking, boating, fishing, hiking, wildlife viewing, and water sports. As described in Section 4.13, Transportation, the Applicant would be required to coordinate construction schedules and any associated road closures with WSDOT and Klickitat County in order to prevent significant disruption. Vehicular access to Cliffs Park, which is the recreational facility that is located closest to the proposed project, is through John Day Dam Road. This portion of John Day Dam Road runs through the project area and would be subject to temporary delays or detours. Visual impacts on users of scenic SR 14 are discussed in Section 4.8, Aesthetics and Visual Quality.

- Temporary changes in access: Construction activities may temporarily affect access to recreational sites that use SR 14 as the main access route or facility entrance. These recreational facilities include Cliffs Park, Railroad Island Park, and Cliffside Launch.

The Applicant would minimize construction impacts to access to recreational facilities to the extent possible. The Applicant would also coordinate with federal, state, and local agencies to reduce conflicts

during construction activities. There are no recreational facilities within the project footprint and impacts to recreational opportunities and access to facilities within 10 miles would only consist of temporary and intermittent traffic and access changes. Therefore, there would be no significant adverse impacts to recreational facilities during construction.

4.12.2.2 Impacts from Operation

The operational proposed project features would not permanently change any existing recreational facilities within the study area. Access to nearby public parks would remain unchanged. The Applicant has stated they have communicated with the local paragliding association and confirmed the project would not interfere with the launching or use of the private paragliding facility at Cliffside Launch (FFP 2020a). Vehicular access on SR 14, U.S. Route 97, and Interstate 84 would remain accessible to residents and travelers. Views for some recreational users, such as those on the Lewis and Clark Trail, may be altered due to the reservoirs and substation, but would remain largely consistent with existing views. Aesthetics and visual quality impacts are discussed in Section 4.8. Other recreational facilities discussed in Section 4.12.1 are not within the project vicinity and are at a distance such that any impacts during operation of the proposed project would be minimal. Therefore, there would be no significant adverse impacts.

4.12.2.3 Proposed Mitigation Measures

Applicant-Proposed Mitigation Measures

No mitigation measures would be required because there would be no significant impacts. Although not required to reduce any significant impacts, the Applicant proposed the following mitigation measures in the FERC FLA, Exhibit E (FFP 2020a) to further reduce potential impacts to recreation from construction and operation of the proposed project:

- **Visual and Recreation Resource Management Plan.** The Applicant will develop a Visual and Recreation Resource Management Plan to identify and implement visual and recreation mitigation measures.
- **Recreational Access Traffic Coordination.** The Applicant will coordinate construction schedules with WSDOT and Klickitat County to prevent interruptions to recreational traffic and access.
- **Interpretive Sign.** The Applicant proposes the installation of an interpretive sign that provides information on the project. The interpretive sign will be placed where the proposed project can be viewed and in an area that is accessible to all members of the public, including people with disabilities.

Relevant Mitigation Measures in Other Sections

In addition to these Applicant-proposed measures, implementation of mitigation proposed in other sections of this EIS would also further reduce impacts to recreation. The following is a brief summary of the WSDOT-proposed transportation mitigation measure; Section 4.13.2.3 contains a complete description of this measure:

- **Transportation Impact Analysis.** This mitigation measure would also minimize recreational access disruptions and provide advance notice of potential disruptions (see Section 4.13).

4.12.2.4 Significant and Unavoidable Adverse Impacts

There would be no significant and unavoidable adverse impacts to recreation opportunities from construction or operation of the proposed project.

4.12.3 Findings for the No Action Alternative

Under the No Action Alternative, the proposed project facilities would not be constructed. Investigation of contamination and development of cleanup actions for the CGA smelter site would continue through a separate MTCA cleanup process. In the absence of the proposed project fully removing the WSI, it is unknown what cleanup action would be required for the WSI through the full site cleanup process, which is underway. For purposes of evaluating the No Action Alternative, it is assumed that the WSI would remain intact and continue to be monitored and maintained under the existing closure plan. However, the WSI would remain within the ongoing MTCA cleanup process for the smelter site and could be subject to additional remedial actions potentially requiring long-term stewardship measures, monitoring, and land-use restrictions that would be expected to be part of the cleanup plan.

The cleanup process may cause temporary construction impacts related to noise and access to recreation. However, there would be no significant adverse impacts related to recreation from the No Action Alternative.

4.13 Transportation

The term "transportation" refers to the system of roads, transit routes, railroads, and airport facilities that move people and goods. This section describes existing transportation facilities and resources in the area and potential impacts and mitigation measures.

Key Findings of the Transportation Analysis

The analysis found the proposed project would have **no significant and unavoidable adverse impacts** to transportation.

Construction traffic, road closures, and detours would result in temporary increases in traffic interference and congestion on regional and local roads and highways throughout the 5-year period of construction.

The proposed project would not include the construction of new roads, require improvement of roads, or include work within road rights-of-way. No transportation infrastructure would be relocated or replaced. Construction would potentially affect roadway infrastructure but is not expected to lead to damage that would require repairs or replacements.

Operations would result in a negligible increase in traffic, primarily employees traveling to and from the project site.

Mitigation is not required to reduce any significant impacts, but strategies are proposed to further reduce potential temporary impacts.

The study area for transportation consists of regional and local transportation networks within Washington that could be directly or indirectly affected by the construction or operation of the proposed project. This includes significant highways and roads within the region that provide north-south and east-west transportation corridors, as well as any construction and detour routes. The study area encompasses the following roads (Figure 4.13-1):

- US 97
- SR 14
- SR 142
- The road system in Goldendale, Washington
- Roadways between the project site and material source and disposal sites
- Hoctor Road, John Day Dam Road, and access roads in the proposed project area

Construction and operation of the proposed project would not use or interact with the nearby BNSF Railway railroad tracks. The proposed project would also not interact or interfere with navigation on the Columbia River. Therefore, the rail system and Columbia River are not included in the study area for transportation nor discussed further in this section. I-5 is approximately 106 miles west of the proposed project and nearby public airports include the Columbia Gorge Regional Airport and the City of Goldendale Municipal Airport. The proposed project would not affect I-5 or air travel, so these are also not included in the study area for transportation nor discussed further in this section.

US 97 is a major north-south highway that spans the entire state. US 97 is primarily a two-lane highway heavily used for the movement of people and goods. SR 14 is a major east-west state route that runs along the north side of the Columbia River. SR 14 varies between two and four lanes and is used for the movement of people and goods. SR 142 is an east-west state route that is located entirely within Klickitat County. SR 142 terminates at US 97 in the City of Goldendale. SR 142 is a two-lane highway used for the movement of people and goods. US 97, SR 14, and SR 142 are WSDOT-designated scenic byways (WSDOT 2021b).

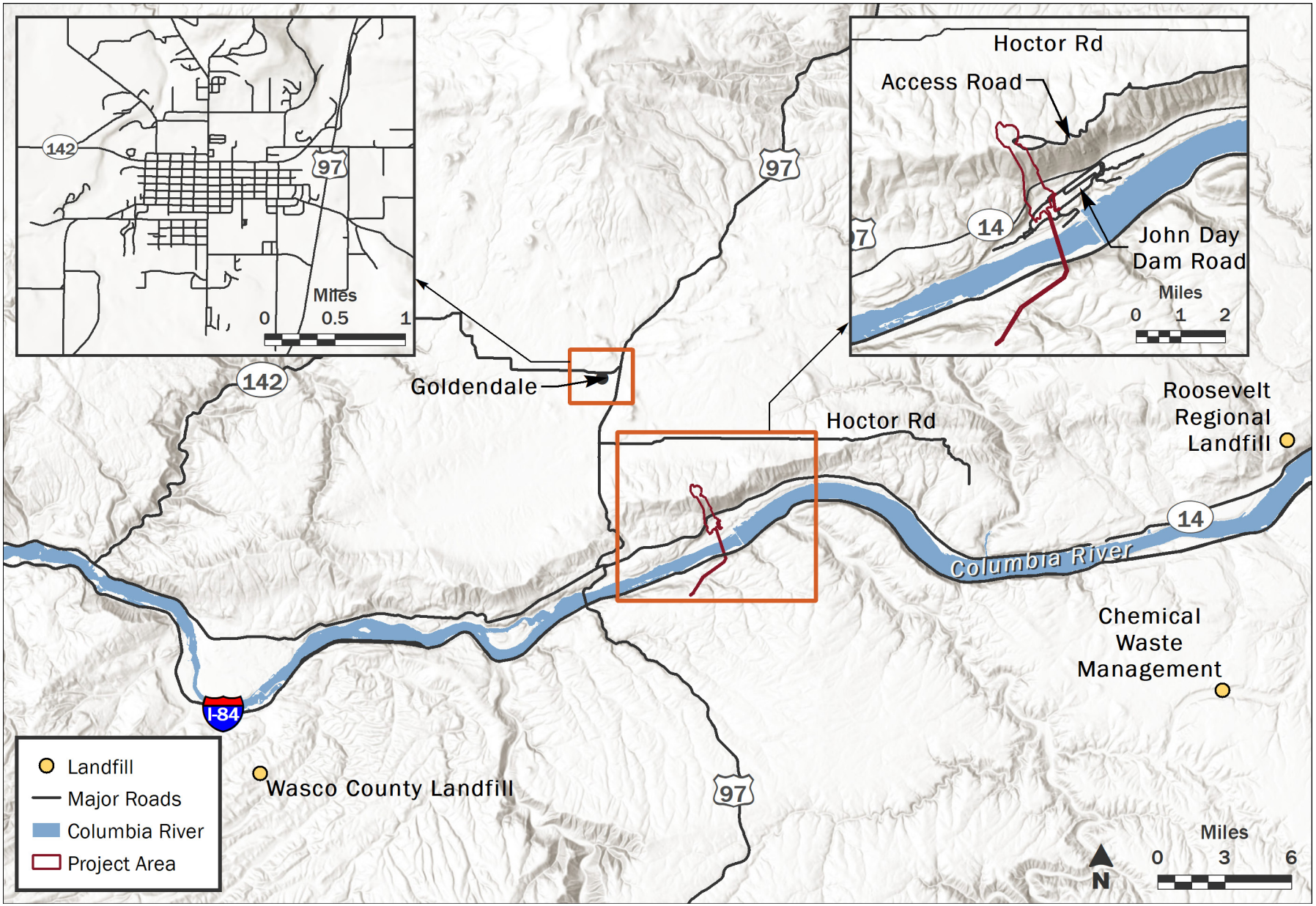
There is one existing public transportation route within the study area. Mt. Adam's Transportation Service provides services between Goldendale, Washington, and The Dalles, Oregon. This route uses US 97,

SR 14, and US 197 to travel between Goldendale and The Dalles (Mt. Adams Transportation Service 2021). US 197 is not within the study area for the proposed project.

The internal road system of the City of Goldendale is primarily used by residents of the City of Goldendale. Hoctor Road is a public two-lane road within Klickitat County that runs east-west. Hoctor Road is used by the public and the nearby Tuolumne Wind Project Authority wind farm. Goldendale School District No. 404 buses use various roads throughout the County, including SR 14 and Hoctor Road (Goldendale School District No. 404 2021). John Day Dam Road currently provides access to the John Day Dam.

Existing private access roads that would be used in the proposed project to reach the upper and lower reservoir areas are not accessible by the public.

Figure 4.13 1
Transportation Study Area



4.13.1 How Impacts Were Analyzed

Transportation impacts were qualitatively and quantitatively evaluated. Transportation impacts within the study area were identified by using information provided by the Applicant, local agency plans (SWRTC 2018), and WSDOT data (WSDOT 2021b). The analysis examined how construction activities and operation of the proposed project could affect transportation by disrupting the movement of goods, mobility, and access, or whether there could be changes to infrastructure within the regional and local transportation networks.

Construction-related traffic—such as construction worker traffic to and from the project site and materials hauling truck trips—was evaluated based on the estimated number of potential trips and potential contributions to traffic congestion on regional and local roads and highways. Trips were estimated by using existing WSDOT information and project-specific information such as the type of equipment being used at the project site and fill/excavation quantities. Temporary road closures or detours during construction were also analyzed. Project operations-related traffic—primarily employee traffic to and from the project site—was evaluated for potential contributions to congestion on regional and local roads and highways. Construction and operation traffic were also evaluated for the potential to lead to roadway infrastructure damage.

Factors considered for the analysis of impacts with respect to transportation included the following:

- How interruptions to traffic patterns or volumes could affect the movement of people and goods
- How transportation infrastructure would be affected by proposed project-related traffic

4.13.2 Findings for the Proposed Project

4.13.2.1 Impacts from Construction

According to the Preliminary Supporting Design Report (HDR 2020a), access to the proposed project area during construction would be provided by surface access roads. No new access roads are anticipated. Access to the lower reservoir site would be provided from the existing John Day Dam Road and would use approximately 0.7 mile of existing private access roads associated with the CGA smelter site (HDR 2020a). Access to the upper reservoir would be provided from the existing Hoctor Road and would use approximately 8.6 miles of existing private roads associated with the Tuolumne Wind Project Authority wind farm (HDR 2020a).

Between the upper and lower reservoirs and crossing under SR 14, construction would include tunnels for water conveyance, power transmission, and access. Water conveyance tunnels would be 15 to 30 feet in diameter and power transmission and access tunnels would be 30 feet in diameter. Power transmission and access tunnels would connect the lower reservoir to the underground powerhouse.

Temporary road closures during construction would be required. SR 14, Hoctor Road, and other roads in the study area could also be subject to detours and additional traffic due to construction of the proposed project. The Applicant has stated that the proposed project would not include the construction of new access roads, require the improvement of roads, or include work within rights-of-way for roads (FFP 2021c, 2022b). It is anticipated that construction activities would occur Monday through Friday between the hours of 7 a.m. and 6 p.m. The contractor may choose to work outside of these days and hours to maintain the construction schedule.

Traffic Interference and Congestion

Construction of the proposed project would require truck, equipment, and employee vehicle trips to and from the project area. Construction would require anywhere between 126 and 805 construction workers,

depending on the phase of construction (FFP 2021a). It is assumed that most of these construction workers would come from and live within Klickitat County or surrounding areas. According to the Regional Transportation Plan for Klickitat County, as of 2010, approximately 11% of workers in the County carpool to work (SWRTC 2018).

Table 4.13-1 estimates the maximum number of daily worker trips by construction year. The calculations below assume that each worker would drive a single-occupant vehicle to and from the construction site. The total number of trips was then reduced by 11% to account for the carpool usage rate in the County. Note that these numbers represent the maximum number of workers on site during any given construction year, indicating that the values in Table 4.13-1 are conservative estimates. On average, there would be approximately 826 worker trips per day during the construction period.

Table 4.13-1
Estimated Construction Worker Trips

CONSTRUCTION YEAR	MAXIMUM NUMBER OF WORKERS ON SITE	MAXIMUM NUMBER OF DAILY WORKER TRIPS[1]
1	272	484
2	805	1,433
3	624	1,111
4	493	878
5	126	224
Average Number of Daily Worker Trips		**826**

Source: FFP 2021a
Note:
1. Assumes an 11% reduction in trips due to carpoolers.

It is assumed that workers would travel to and from the project area using a combination of US 97, SR 14, SR 142, the road system of the City of Goldendale, Hoctor Road, John Day Dam Road, and access roads at the project area. The route that workers would take would depend on where they are commuting from. Although SR 142 provides east-west passage through Goldendale, the internal road system of Goldendale, as shown in Figure 4.13-1, could also be used by construction workers. However, it is assumed that the travelers that would be using the City's internal road network would be those that live within Goldendale.

The addition of an average 826 daily trips spread throughout roads in the study area could result in temporary or sporadic increased traffic volumes but is not likely to result in noticeable delays to the movement of people and goods. Depending on the construction phase, there would be less, or more, daily trips generated.

As discussed in Chapter 2, the proposed project would require approximately 1 million cubic yards of imported fill to construct underground tunnels, substation and switchyards, utility infrastructure tie-ins, internal access roads, temporary construction laydown and parking areas, and construction access road extensions. Sources of this imported fill have not been identified by the Applicant at the current level of design, resulting in uncertainty in travel distances that would be required. Driving distances from the lower reservoir to the nearest populated areas (Figure 4.13-2) are as follows: 17 miles to Rufus, Oregon; 20 miles to Goldendale, Washington; and 32 miles to The Dalles, Oregon. Construction materials may also be sourced from locations at a greater distance than these examples.

A portion of the lower reservoir would be located within the WSI area associated with the former CGA smelter. Investigation of contamination and development of cleanup actions are proceeding through a separate process, but it is currently assumed that as part of the proposed project, the WSI would be removed and would require the excavation of 145,550 cubic yards of soil (ERM 2021b). It is currently assumed that this volume of excavated cleanup site material would require transportation via truck to a suitable off-site disposal location. Additional information about the WSI and potential material disposal is in Section 4.10, Environmental Health. Any materials from the WSI would be disposed of at appropriate landfills, depending on soil characteristics, facility permit requirements, and economic factors. The facilities that could potentially accept contaminated soil (if present at the WSI) would include Roosevelt Regional Landfill in Klickitat County, the Wasco County Landfill in The Dalles, Oregon, or Chemical Waste Management in Arlington, Oregon. The locations of these landfills and likely routes are shown in Figure 4.13-2.

The average hauling capacity of a full-size dump truck is between 10 and 16 cubic yards (J.D. Power 2021). In total, 1,145,550 cubic yards of soil is assumed to be moved to or from the proposed project location during construction. Table 4.13-2 provides an estimated range of the number of off-site truck trips that would be required throughout the construction period.

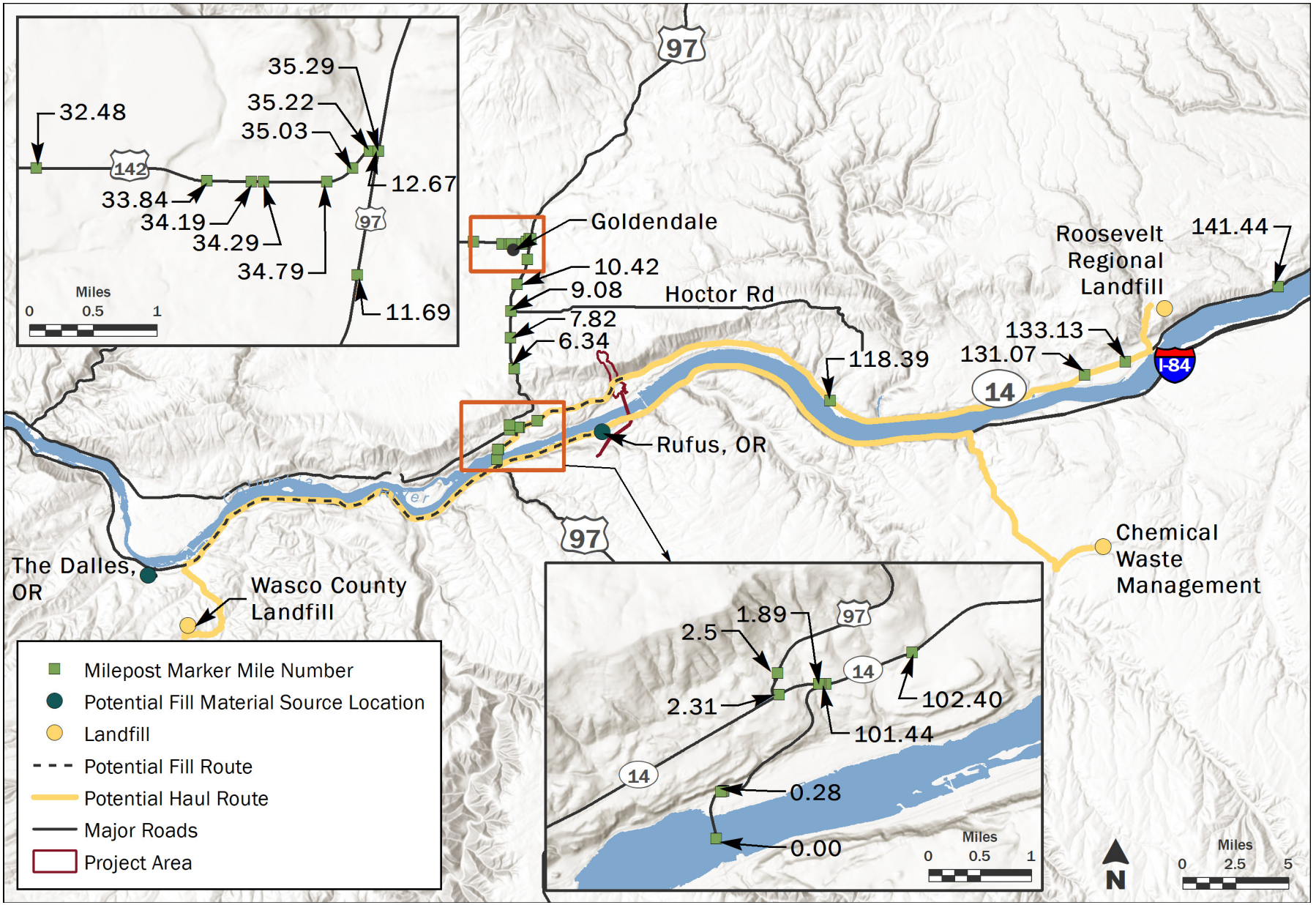
Table 4.13-2
Estimated Truck Trips for the Proposed Project

HAUL TRUCK TYPE	DAILY TRIPS[1]	ANNUAL TRIPS[2]	TOTAL TRIPS
Import/Export (1,145,550 cy)			
10 cy haul truck	88	22,911	114,555
16 cy haul truck	55	14,319	71,597
Import (1,000,000 cy)			
10 cy haul truck	77	20,000	100,000
16 cy haul truck	48	12,500	62,500
Export (145,550 cy)			
10 cy haul truck	11	2,911	14,555
16 cy haul truck	7	1,819	9,097

Notes:
1. Assumes 52 weeks, 5 days per week, for 5 years.
2. Assumes a 5-year construction window.
cy: cubic yards

As shown in Table 4.13-2, approximately 71,600 to 114,600 dump truck trips to and from the proposed project would be needed over the 5-year construction period, depending on the size(s) of trucks used. This would equate to approximately 55 to 90 truck trips per day, depending on the size(s) of the dump truck used. Because soil import would account for 1 million cubic yards of the total 1,145,550 cubic yards of soil, the majority of daily truck trips would be attributed to importing soil to the proposed project during construction.

Figure 4.13 2
Potential Construction Haul Routes



Data Source: WSDOT 2021b

As defined by WSDOT, annual average daily traffic is the total daily volume of traffic passing a point or segment of a highway in both directions (WSDOT 2021c). Table 4.13-3 shows the route that would be taken from the project area to each landfill or between the project area and the nearest populated areas (Rufus, Goldendale, and The Dalles), and the associated route's annual average daily traffic. Three potential routes could be used, depending on the destination. As previously discussed, sources of imported fill have not been identified by the Applicant at the current level of design, resulting in uncertainty in travel distances that would be required. Construction materials may also be sourced from locations a greater distance than these examples. The routes that are assumed to be taken for this analysis, and associated mileposts noted in Table 4.13-3, are shown in Figure 4.13-2. Table 4.13-4 summarizes the percentage increases in traffic that would occur during construction of the proposed project.

Table 4.13-3
Annual Average Daily Traffic for Applicable Highway Segments

POTENTIAL SOURCE OR LANDFILL	ROUTE TAKEN TO/ FROM DESTINATION	ASSOCIATED MILEPOSTS	AADT FOR ASSOCIATED SEGMENT
Roosevelt Regional Landfill	East/west on SR 14	102.40 to 118.39	1,200
		118.39 to 131.07	1,100
		131.07 to 133.13	1,200
		133.13 to 141.44	1,100
		Average AADT for Route	**1,150**
Oregon destinations: Wasco County Landfill, Chemical Waste Management, Rufus, OR, and The Dalles, OR	East/west on SR 14	102.40 to 118.39	1,200
		101.44 to 102.40	1,200
	Average AADT for Portions of Route within Washington		**1,200**
	North/south on US 97	0.28 to 1.89	4,800
		0.00 to 0.28	5,200
	Average AADT for Portions of Route within Washington		**5,000**
Goldendale, WA	East/west on SR 14	102.40 to 118.39	1,200
		101.44 to 102.40	1,200
		Average AADT for Route	**1,200**
	North/south on SR 97	2.31 to 2.50	4,500
		2.50 to 2.59	2,300
		2.59 to 6.34	6,000
		6.34 to 7.82	6,100
		7.82 to 9.08	6,200
		9.08 to 10.42	5,100
		10.42 to 11.69	4,900
		11.69 to 12.67	4,700
		Average AADT for Route	**4,975**
	East/west on SR 142	32.48 to 33.84	1,700
		33.84 to 34.19	2,400
		34.19 to 34.29	3,000
		34.29 to 34.79	3,700
		34.79 to 35.03	3,400
		35.03 to 35,22	2,900
		35.22 to 35.29	2,500
		Average AADT for Route	**2,800**

Source: WSDOT 2021b
AADT: average annual daily traffic

Table 4.13-4
Percentage Increase in Average Annual Daily Traffic Along Construction Routes

POTENTIAL SOURCE OR LANDFILL	ROUTE TAKEN TO/FROM DESTINATION	AVERAGE AADT FOR ROUTE	PERCENTAGE INCREASE IN AADT ALONG ROUTE
Roosevelt Regional Landfill	East/west on SR 14	1,150	5% to 8%
Oregon destinations: Wasco County Landfill, Chemical Waste Management, Rufus, OR, and The Dalles, OR[1]	East/west on SR 14	1,200	5% to 8%
	North/south on US 97	5,000	1% to 2%
Goldendale, WA	East/west on SR 14	1,200	5% to 8%
	North/south on SR 97	4,975	1% to 2%
	East/west on SR 142	2,800	2% to 3%

AADT: average annual daily traffic
Note:
1. Traveling to any of the Oregon destinations from the project area would require traveling west on SR 14 and south on SR 97 into Oregon. Once in Oregon, trucks would travel east and west along I-84 and SR 30. I-84 and SR 30 run concurrently to each other in Oregon. However, because these roads are excluded from the study area, the proposed project's contribution to annual average daily traffic along these roads in Oregon is not analyzed.

As shown in Table 4.13-4, the addition of 55 to 90 daily haul truck trips on these routes during construction would result in increases in daily traffic ranging from 1% and 8%, depending on the destination. It is likely that multiple landfills and fill sources would be used, thereby spreading the number of daily haul truck trips across routes, resulting in less concentrated increases in traffic. Haul truck trips associated with construction of the proposed project have the potential to result in temporary or sporadic increases in traffic volumes, which may result in minor delays.

Temporary road closures and detours would occur throughout the 5-year period of construction of the proposed project. SR 14, Hoctor Road, and other roads in the study area could be subject to detours and additional traffic due to construction. Goldendale School District No. 404 buses use various roads throughout the County, including SR 14 and Hoctor Road (Goldendale School District No. 404 2021). Because Mt. Adam's Transportation Service uses SR 14, the existing public transportation route could be impacted during temporary road closures and detours. Road closures and detours would result in short-term planned road closures, interrupting traffic patterns or volumes, resulting in delays or detours, and potentially causing different routes within the transportation network to be used to ensure the adequate movement of people and goods.

In summary, construction of the proposed project would require truck, equipment, and employee vehicle trips to and from the project area that would result in a minor increase in congestion on regional and local roads and highways. Road closures and detours associated with construction would also moderately increase traffic interference and congestion. There would be no significant adverse impacts with respect to traffic interference and congestion during construction.

Roadway Infrastructure Damage

The proposed project would not include the construction of new access roads, require the improvement of roads, or include work within rights-of-way for roads. No transportation infrastructure would be relocated or replaced during construction.

It is assumed that haul trucks would always be covered while in transit to and from the project area. Covering haul trucks would reduce the likelihood of soil, rocks, and any potential debris in the soil

escaping from the truck while in operation, thereby decreasing the risk of incidental damage to roadway infrastructure. Additionally, haul truck operators would be required to adhere to all federal, state, and local regulations concerning transportation. Adherence to regulations related to vehicle weight, overhead clearance, and load sizes would reduce the potential for risk to roadway infrastructure.

As discussed above, traffic associated with construction of the proposed project would increase use of the regional transportation network within the study area. Routine use of the regional transportation network within the study area during construction would not excessively damage roads or transportation infrastructure but would contribute to deterioration of the roadway through normal use over time. However, any damage would be minor and would not likely require repairs to return to pre-construction conditions.

Parking for construction employees and construction equipment would be provided adjacent to the footprint of each reservoir (FFP 2020a). As such, parking off site would not be required during construction, thereby eliminating the possibility that workers would park on SR 14 or other nearby public roads. This would help to reduce the potential for risk to roadway infrastructure.

The tunnels and the powerhouse cavern beneath SR 14 would be constructed using conventional tunneling techniques. These techniques would include the use of a diesel-powered mining machine or drilling machines. The use of explosives or blasting would not be required to construct the underground tunnels that would cross under SR 14. Because tunnel drilling would occur below the surface, there is a minimal risk of damage to SR 14.

In summary, construction of the proposed project would potentially affect roadway infrastructure but is not expected to lead to damage that would require repairs or replacements. There would be no significant adverse impacts with respect to roadway infrastructure damage during construction.

4.13.2.2 Impacts from Operation

Project operations-related traffic would primarily be employee traffic to and from the project site. Parking for employees would be provided at the completed project.

Traffic Interference and Congestion

Operation of the proposed project would require approximately 40 to 60 employees. Up to half of these workers are assumed to be from Klickitat County, with the remaining residing elsewhere in Washington or in Oregon (FFP 2020a). Assuming each employee would work a single shift every day and would operate a single-occupant vehicle, operation of the proposed project would contribute approximately 80 to 120 daily trips to the study area. With an 11% reduction in trips due to carpoolers, this would equate to between 72 and 107 trips. However, this scenario would not be anticipated because the operational facility would not be fully staffed at all times (FFP 2020b). Therefore, the addition of 72 to 107 daily trips, or less, would be a negligible increase in traffic. The addition of these trips spread throughout the study area could result in temporary or sporadic increased traffic volumes but is not likely to result in noticeable delays to the movement of people and goods. There would be no significant adverse impacts with respect to traffic interference and congestion during operation.

Roadway Infrastructure Damage

During operation, routine use of the regional transportation network would be negligible and would not be expected to result in damage to roads or transportation infrastructure. There would be continued minor deterioration of roadways through normal use over time. This use is not expected to lead to damage that would require repairs or replacements. There would be no significant adverse impacts with respect to roadway infrastructure damage during operation.

4.13.2.3 Proposed Mitigation Measures

Applicant-Proposed Mitigation Measures

Although not required to reduce any significant impacts, the Applicant proposed the following mitigation measures in the FERC FLA, Exhibit E (FFP 2020a) and their SEPA Checklist (FFP 2020b) to further reduce potential effects from construction and operation of the proposed project:

- **Construction Traffic Coordination.** The Applicant would coordinate construction schedules, any temporary road or lane closures, and any traffic control measures with WSDOT and Klickitat County to minimize disruption of existing traffic on public roads.
- **Construction Traffic Management Plan.** A Construction Traffic Management Plan containing applicable traffic control measures (e.g., signage, flaggers at key intersections, reduced speed limits or other speed control devices, controlled or limited access routes) would be prepared in coordination with the applicable government agencies. Access to and from the construction site would be closed to the public.

WSDOT-Proposed Mitigation Measures

WSDOT has requested that a Transportation Impact Analysis be completed prior to construction for the proposed project, which is reflected in the following mitigation measure:

- **Transportation Impact Analysis.** A Transportation Impact Analysis would be completed in accordance with Chapter 320 of the WSDOT Design Manual to further analyze construction traffic impacts. The Transportation Impact Analysis would include an analysis of the potential for an eastbound right turn deceleration lane and a westbound left turn lane at the entrance to the proposed project. If it is determined that improvements to SR 14 or any other WSDOT facilities are warranted to compensate for impacts from the proposed project, the Applicant would need to work directly with WSDOT on the design, approval, and inspection of those improvements. Other requirements could include, but are not limited to, stormwater treatment and detention facilities, illumination, signing, environmental review, and permitting.

Specific permit conditions and mitigation actions would be confirmed by regulatory agencies during permitting for the proposed project and implemented with, or as part of, the required permits, plans, and approvals.

4.13.2.4 Significant and Unavoidable Adverse Impacts

There would be no significant and unavoidable adverse impacts related to transportation from construction or operation of the proposed project.

4.13.3 Findings for the No Action Alternative

Under the No Action Alternative, the proposed project facilities would not be constructed. Investigation of contamination and development of cleanup actions for the CGA smelter site would continue through a separate MTCA cleanup process. In the absence of the proposed project fully removing the WSI, it is unknown what cleanup action would be required for the WSI through the full site cleanup process, which is underway. For purposes of evaluating the No Action Alternative, it is assumed that the WSI would remain intact and continue to be monitored and maintained under the existing closure plan. However, the WSI would remain within the ongoing MTCA cleanup process for the smelter site and could be subject to additional remedial actions potentially requiring long-term stewardship measures, monitoring, and land-use restrictions that would be expected to be part of the cleanup plan.

If the No Action Alternative would not include removal of the WSI, it would not be expected to generate truck trips. Therefore, there would be no significant adverse impacts related to transportation under the No Action Alternative.

4.14 Environmental Justice

Environmental justice is defined in Washington State as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, rules, and policies. This section discusses environmental justice as it relates to communities of color and low-income populations. Impacts to potentially affected Tribal communities are discussed in Section 4.9, Cultural and Tribal Resources, and the *Tribal Resources Analysis Report* (Appendix H).

The *Environmental Justice Report* (Anchor QEA 2022d), in Appendix J, has the full description of existing conditions in the affected environment, as well as the full analysis and technical details used to evaluate environmental justice. This section summarizes how impacts were evaluated and summarizes the findings of that report.

Key Findings of the Environmental Justice Analysis

The analysis found the proposed project would have **no significant and unavoidable adverse impacts** related to environmental justice.

The project **would not have a disproportionate impact** on communities of color or low-income populations.

Mitigation is not required to reduce any significant impacts.

However, the proposed project would have significant adverse impacts on Tribal Resources, as discussed in Section 4.9 and the Tribal Resources Analysis Report (Appendix H).

The study area for environmental justice includes people living within 2 miles of the project footprint within Washington State. This accounts for people that would most likely be affected by construction or operation of the proposed project.

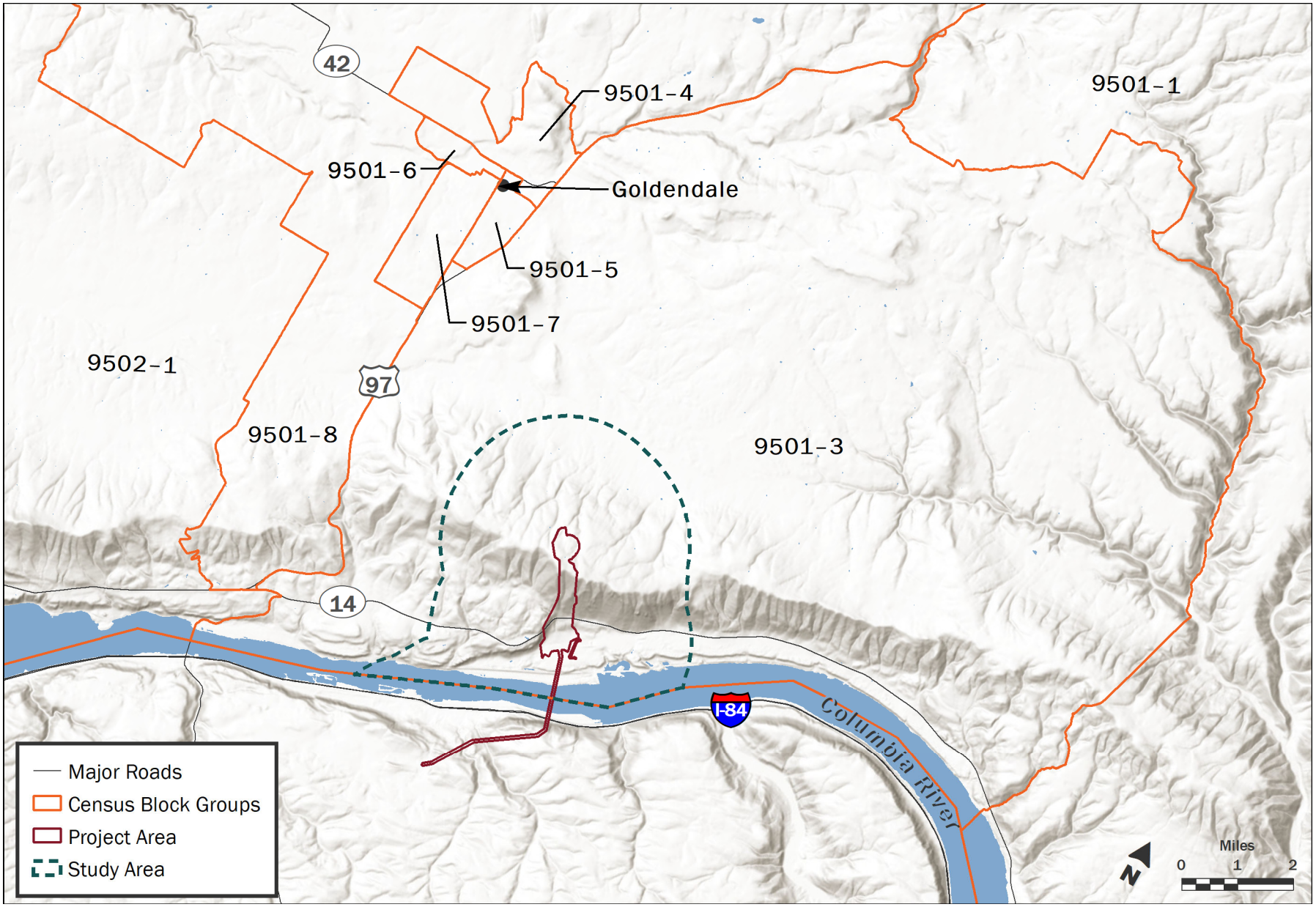
The study area intersects one Census block group, Block Group 3 in Census Tract 9501 (Figure 4.14-1). When compared to Klickitat County as a whole, this block group has a greater percentage of people of color and a greater percentage of low-income residents (ACS 2019). However, the area where the study area overlaps with the Census block group has a very low level of development. The study area is rural and relatively isolated, with no homes in or immediately adjacent to the proposed project area. There are scattered farm residences west and north of the northern extent of the proposed project, and a single reported residence 0.4 mile away from the lower reservoir area (FFP 2020a, 2022a).

The study area was not identified as an overburdened community based on review of the Environmental Health Disparities layer of the Washington Tracking Network (WTN 2022).

Overburdened community refers to an area where vulnerable populations face multiple combined environmental harms and health impacts.

These areas can include, but are not limited to, highly impacted communities designated by the Washington Department of Health (RCW Chapter 70A.02).

Figure 4.14-1
Environmental Justice Study Area



4.14.1 How Impacts Were Analyzed

The analysis included population and demographic data from the U.S. Census Bureau's American Community Survey and the Washington Tracking Network's Environmental Health Disparities layer. Potential disproportionate impacts from the proposed project on communities of color and low-income populations were evaluated using findings from the other resource analyses and sections of this EIS. Those analyses examined potentially significant adverse direct and indirect impacts from construction and operation of the proposed project and from the No Action Alternative. If the analyses identified significant adverse impacts to a resource area, those impacts were further assessed for their potential to disproportionately affect communities of color and low-income populations.

To guide public outreach planning for the EIS, the analysis also identified other population demographic characteristics such as limited English proficiency, educational attainment, and age. These characteristics were not evaluated relative to determining the potential for impacts in the environmental justice analysis. Information to guide public outreach planning is in Section 4 of the *Environmental Justice Report* in Appendix J but is not discussed further in this section.

4.14.2 Findings for the Proposed Project

4.14.2.1 Impacts from Construction

No direct or indirect significant adverse impacts on people from construction were identified for any of the resource areas. Therefore, there would be no disproportionate impacts from construction on communities of color or low-income populations.

4.14.2.2 Impacts from Operation

No direct or indirect significant adverse impacts on people from operation of the proposed project were identified for any of the resource areas. Therefore, there would be no disproportionate impacts from operation on communities of color or low-income populations.

4.14.2.3 Proposed Mitigation Measures

No mitigation measures are proposed because there are no disproportionate impacts to communities of color and low-income populations.

Impacts to Tribal Resources

Although Tribal reservations do not overlap the study area, the area is used by and culturally important to the Confederated Tribes and Bands of the Yakama Nation, the Confederated Tribes of the Umatilla Indian Reservation, the Confederated Tribes of the Warm Springs Reservation of Oregon, and the Nez Perce Tribe. Uses include hunting, traditional gathering, camping, and traditional Tribal rituals, such as ceremonies and vision quests, and other traditional practices.

The proposed project would have significant adverse impacts on Tribal resources. Impacts to potentially affected Tribal communities and the potential for mitigation are discussed in Section 4.9, Cultural and Tribal Resources, and the *Tribal Resources Analysis Report* in Appendix H.

4.14.2.4 Significant and Unavoidable Adverse Impacts

There would be no significant adverse impacts to communities of color or low-income populations from construction or operation of the proposed project.

4.14.3 Findings for the No Action Alternative

No significant adverse impacts of the No Action Alternative were identified for any of the resource areas. Therefore, the No Action Alternative would result in no disproportionate impacts on communities of color or low-income populations.

5 Climate Change

Rising levels of GHGs (such as carbon dioxide and other heat-trapping gases) have warmed the earth and are causing wide-ranging impacts worldwide, such as increased drought, wildfires, and extreme rainfall events. Scientists project that these trends will continue and in some cases accelerate, posing significant risks to human health, communities, forests, agriculture, freshwater supplies, coastlines, and other natural resources. Large-scale models with a range of scenarios are often used to predict the likely impacts related to climate change in the future. Regional studies can be used to further refine these predictions for a specific area. For this EIS, the focus is on climate change information that is available for the Columbia River Basin, which includes all the lands for which surface water flows to the Columbia River. This area mostly covers the states of Washington, Oregon, and Idaho, with limited reach into Wyoming, Montana, and British Columbia. Where available, information is also provided that is more narrowly focused on the portion of the Columbia River Basin near the proposed project.

Key Findings of the Climate Change Analysis

Climate change is a global issue driven by a multitude of emissions sources worldwide, which leads to a great deal of uncertainty about future conditions.

It is anticipated that the proposed project's GHG emissions would not contribute to appreciable impacts on climate change.

Based on the information available, it is not anticipated that the effects of climate changes would substantially impact the proposed project, nor would they substantially alter the impact determinations for resources in the Draft EIS.

There is uncertainty related to the magnitude of the future effects of climate change and how the changing climate will affect water availability, as well as some species and habitats.

This chapter evaluates impacts related to climate change and considers impacts from the following three perspectives:

- Adverse impacts of the proposed project that contribute to the effects of climate change in the region (e.g., the effects of new sources of GHG emissions from the proposed project)
- Adverse impacts of climate change on the proposed project's infrastructure or operations (e.g., the effects of rising air and water temperatures, reduced snowpack, changes in water availability, changes in seasonal streamflow, increased occurrence of wildfires, or more extreme flooding and drought conditions)
- Changes from climate change in the region that could increase or decrease the adverse impacts from the proposed project relative to the resources analyzed in the EIS

The following approach was used to evaluate climate change:

- A review of applicable literature was conducted to detail forecasted climate change impacts on the regional setting for the proposed project. Findings are summarized in Section 5.1.
- Impacts related to climate change were evaluated to determine if there were project impacts that contribute to the effects of climate change and adverse impacts of climate change on the proposed project. Comments received during scoping that related to climate change were also considered. Findings are summarized in Section 5.2.
- The findings from Sections 5.1 and 5.2 were evaluated along with the adverse impacts of the proposed project and No Action Alternative. A qualitative assessment of impacts relative to the resource areas in the Draft EIS is provided in Section 5.3.

5.1 Climate Change in the Region

The subsections below describe trends based on recent regional climate change studies for air temperature; annual and seasonal precipitation, snowpack, streamflow, and groundwater (including extremes such as flooding and drought); water temperature; and wildfire. The subsections provide information focused on the portion of the Columbia River Basin near the proposed project, or the entire Columbia River Basin, as applicable.

The Columbia River Basin is the lands for which water flows to the Columbia River. This mostly covers the states of Washington, Oregon, and Idaho with limited reach into Wyoming, Montana, and British Columbia.

5.1.1 Air Temperature

Average annual daily maximum temperatures have warmed in the Columbia River Basin by about 1.5°F since the 1970s and are projected to continue increasing into the 2030s (RMJOC 2018). The magnitudes of daily maximum temperature increases are expected to vary seasonally and differ based on location. The proposed project area is east of the Cascades that divide the Columbia River Basin's interior and coastal portions. More warming is projected in the interior areas of the basin including the proposed project area, compared to areas near the Pacific Coast. Warming is also projected to be greater during the summer months.

Currently, the proposed project area is characterized by hot and dry conditions in the summer (90°F average daytime high temperature in July) and relatively cold conditions in the winter (40°F average daytime high temperature in December), with some moderation in temperatures due to proximity to the Columbia River (Tetra Tech et al. 2015). A River Management Joint Operating Committee study found that trends of increased warming are nearly certain to continue, with average annual daily maximum projected temperature increases from the historical period (1970 to 1999) to the 2030s ranging from 2.0 °F to 5.5 °F across the Columbia River Basin.

5.1.2 Precipitation, Snowpack, Streamflow, and Groundwater

Precipitation

The Columbia River Basin experiences large seasonal variability in precipitation each year, and this variability is projected to continue, with more precipitation during the winter months than the summer months. Most of the precipitation in the area currently occurs November through February, with the wettest months being December and January (Tetra Tech et al. 2015). For the purposes of preliminary design, using available data from the Western Regional Climate Center's John Day climate station, HDR (2020a) estimated an annual average precipitation of approximately 10 inches for the lower reservoir area (southern portion of study area) and 17 inches for the upper reservoir area (northern portion of study area). Annual precipitation levels vary each year with some years being below average and some above. By the 2030s, the average annual precipitation will begin to exceed the historic long-term average more than 50% of the time (RMJOC 2018), resulting in more years with above-average precipitation.

Snowpack

Warmer temperatures are likely to decrease snowpack over time, reducing spring and summer runoff (RMJOC 2018). Snowpack is likely to decrease despite increases in overall annual precipitation, as a higher portion of precipitation would fall as rain instead of snow. Reduced snowpack magnifies the effect on stream flows because historically most of the Columbia River Basin's annual precipitation and flow have been snow-dominated, with at least half of the annual precipitation falling as snow. Between 2020 and 2049, the April 1 Snow Water Equivalent is projected to be 10% to 60% lower in the Cascade Mountains, coastal mountains, and lower portions of the Clearwater and Spokane River Basins (tributaries to the Columbia River), with continued decreases over time as more precipitation falls as rain instead of snow (RMJOC 2018).

April 1 Snow Water Equivalent is a metric for year-to-year comparison of snowpack. Peak snowpacks in the Columbia River Basin typically occur near April 1. This metric is often used to help predict available water reserves for the summer months.

Streamflow

There are multiple changes to streamflow projected for the Columbia River Basin, including higher average winter flows, earlier peak spring runoff, lower average summer flows, a longer period of low summer flows, or a combination of all of these (RMJOC 2010; RMJOC 2018; USGCRP 2017; DOE 2017; Reclamation 2016). Although model projections show increased summer precipitation in some areas, this will not significantly offset lower summer streamflow stemming from reduced snowpack. For the Columbia River Basin as a whole, the warming temperatures and tendency for increased precipitation, particularly in the already wet winter months, will result in higher winter and spring volumes with earlier spring flow peaks. In the summer, there will be slightly lower flows or a longer period of low flows. Droughts during summer months could become more frequent and severe (USGCRP 2018). Specific to the region of the study area, the projected streamflow changes include higher winter and spring streamflows with lower flow volumes in the summer months (USACE et al. 2020).

The Columbia River has been developed into a highly regulated river system, with a variety of federal and state agencies and private utilities operating dams on the river for a variety of uses. The proposed project footprint is adjacent to one of these dams, John Day Dam. One element of Columbia River management is the Instream Resource Protection Program for the Main Stem Columbia River in Washington State (WAC 173.563). The program establishes minimum instream flows for the mainstem of the Columbia River to provide for the preservation of wildlife, fish, scenic, aesthetic, and other environmental and navigational values. The minimum instream flows specify the amount of water needed in a particular place for a defined time, typically following seasonal variations, to protect and preserve instream resources and uses. WAC 173.563 establishes minimum instream flows for five management units along the mainstem of the Columbia River, each of which has an associated control station designated for flow monitoring. The U.S. Geological Survey gage at The Dalles, Oregon (ID No. 14105700), roughly 24 miles downstream of the proposed project footprint, is used to define Columbia River flows in the vicinity of the proposed project. Columbia River flows are also subject to the Biological Opinion issued most recently in July 2020 by the National Oceanic and Atmospheric Administration's National Marine Fisheries Service for the Federal Columbia River Power System to protect threatened and endangered fish species (NOAA Fisheries 2020). The Biological Opinion represents flows necessary to protect salmonids listed under the Endangered Species Act.

Because of the highly regulated nature of the Columbia River system, there will continue to be adjustments to operation of the system of dams and associated reservoirs to meet minimum flow objectives in the face of climate change. Winter outflows from the dams and fluctuations in water storage at the reservoirs could become more variable, and unregulated spring flow from snowmelt that passes

through the dams in the vicinity of the proposed project is projected to occur earlier, with potential decreases in flow starting in June (USACE et al. 2020).

The northern portion of the project footprint drains northward to Swale Creek. As noted in Section 4.2, Water Resources, of this EIS, the portion of Swale Creek in Swale Valley currently flows during the winter and early spring but is commonly dry from early summer until winter precipitation begins. In Swale Canyon downstream of Swale Valley, creek flows are flashy, with high flows occurring for short durations in response to winter storm events or snowmelt runoff (Aspect Consulting 2010, 2013). For much of the rest of the year, water in Swale Canyon typically exists as a series of discontinuous pools with little connecting flow. Because flows in the Swale Creek watershed are dominated by winter storm events and snowmelt runoff, changes to flows are expected to follow regional changes to rain and snowfall patterns. There will be a tendency for higher winter precipitation and lower summer precipitation (USACE et al. 2020), leading to higher winter flows and lower summer flows in the Swale Creek watershed.

Groundwater

Groundwater recharge refers to processes through which water moves from surface water to groundwater and into or through the water table and aquifers.

Direct climate change impacts on groundwater include potential alterations in the timing and amount of groundwater recharge; the level of groundwater and surface water interaction and baseflow discharge; and the quality and temperature of groundwater. Such impacts are more likely to affect the uppermost portions of groundwater systems (e.g., surficial aquifers) as they are more directly coupled to meteorological conditions and are where most of the ground and surface water interactions occur (Ecology 2016b). With future climate change, increases in groundwater recharge potential could occur during the fall and winter as a result of predicted increases in heavy precipitation events during those periods. Although summer precipitation events are also expected to occur more frequently, projected increases in summer air temperatures and evapotranspiration rates are likely to offset any potential increases in groundwater recharge during that time of year. Research suggests that changes in groundwater recharge from climate change are more likely to be associated with the timing of recharge than the overall amount, with direct climate-driven changes in long-term recharge rates likely to be modest compared to natural variability (Ecology 2016b).

Potential shifts in the timing of groundwater recharge may also affect seasonal flow patterns between groundwater and surface waters (Ecology 2016b). The shift in peak spring runoff and groundwater recharge to earlier in the year, coupled with increased air temperature and reduced stream flow in the summer, could result in reduced baseflow discharges to surface waters and wetlands during the latter portion of dry season. Research on the effects of climate change on groundwater quality is limited and the type and range of potential changes are not as well understood as the potential effects of climate change on surface water quality (Ecology 2016b). Groundwater quality and temperature could be affected by shifts in the timing of groundwater recharge. Heavier precipitation during the fall and winter months may increase downward mobilization of soluble chemicals in the soil (Ecology 2016b). However, if such storms are intense enough and soil infiltration capacities are exceeded, such that the heavier precipitation largely runs off, recharge and associated leaching of soluble chemicals may not increase appreciably. Groundwater temperature could also be susceptible to changes to warmer summer temperatures, with even small increases potentially affecting the chemical quality of groundwater and related geochemical processes in the soil (Ecology 2016b).

5.1.3 Water Temperature

Data showing water temperature trends in the Columbia River Basin (O'Connor 2021) show long-term warming water temperatures of approximately 0.5 °F (0.3 °C) per decade (USACE et al. 2020). Water

temperature varies between measurement sites, periods of analysis, and seasons. Trends show an increase of water temperature in the Columbia River mainstream and tributaries, primarily caused by increased air temperature (Yearsley 2009; Isaak et al. 2018; both as cited in USACE et al. 2020).

By the year 2100, several studies project that the Columbia River summer mainstem river temperature could increase 3.1°F to 3.6°F (1.7 to 2.0°C) (e.g., Yearsley 2009; Isaak et al. 2018; both as cited in USACE et al. 2020). Similar increases are projected for Columbia River tributaries (USEPA 2020), with a wider range of summer water temperatures for Columbia River tributaries projected by the end of the century of 1.8°F to 9.0°F (1°C to 5°C) (e.g., Cristea and Burges 2010; Mantua et al. 2010; Wu et al. 2012; Beechie et al. 2013; Caldwell et al. 2013; Isaak et al. 2017; all as cited in USACE et al. 2020).

As noted in Section 4.2, Water Resources, Lake Umatilla (the reservoir behind John Day Dam, near the proposed project) and the lowermost approximately 3 miles of Swale Creek, within Swale Canyon, are on the state 303(d) list (Category 5) as impaired for water temperature (Ecology 2016a, 2018). This designation means the waters are subject to a TMDL that determines a temperature reduction target and allocates load reductions necessary to the source(s) in order to meet specific standards to protect water quality. In August 2021, USEPA reissued a TMDL for water temperature in the Columbia and lower Snake rivers (USEPA 2021). The TMDL determined that the allowable thermal loading capacity of the Columbia and lower Snake rivers is limited, and total allowable increases in river temperature of 0.3°C will be allocated to all point and nonpoint sources combined. USEPA divided the 0.3°C allowable loading capacity equally among the river's dam impoundments, NPDES point sources, and tributaries. A reserve allocation for each reach of the TMDL study areas to accommodate future growth, new sources, and waste load allocation adjustments for existing facilities was also included.

5.1.4 Wildfire Occurrence and Intensity

The past 40 years have seen an uptick in large forest fires and this trend is expected to continue with warming temperatures associated with climate change (USGCRP 2017 *as cited in* USACE et al. 2020). Fire activity is influenced by many factors including seasonal temperature and precipitation, vegetation, soil moisture, topography, and forest management practices. Particularly in the Columbia Basin, fire activity changes with annual snowpack. Regional trends indicate the region will have increased fire activity resulting from decreased snowpack related to climate change (USACE et al. 2020). Drier and warmer summers due to climate change will also increase wildfire frequency, compounding the effects of reduced snowpack. Increases in vegetative fuel also play a role in magnifying wildfire frequency and severity (Littell et al. 2009; McKenzie and Littell 2016; *as cited in* USACE et al. 2020). The lower Columbia Basin near the study area is semi-arid and is expected to see an increase in the production of fine fuels (e.g., grass and shrubs) following changes in seasonal precipitation trends from climate change impacts (USACE et al. 2020). This will likely result in increased understory growth that becomes dead fuel (fuel with a moisture content less than 30%) in subsequent years (Littell et al. 2009; McKenzie and Littell 2016; *as cited in* USACE et al. 2020). As such, increases in vegetative fuels are also expected to contribute to more frequent and severe wildfires in the region of the study area.

5.2 Potential Effects Related to Climate Change

5.2.1 Effects of the Proposed Project Contributing to Climate Change

Climate change is a global issue driven by a multitude of different types of sources and magnitudes of emissions in locations worldwide. GHG pollutants mix within the atmosphere on a global scale to contribute to the greenhouse effect worldwide. This differs from other pollutants such as air toxics, which generally impact the area near the source. The global nature of how GHG pollutants contribute to climate

change makes it difficult to quantitatively connect individual sources of GHG emissions with an exact magnitude of climate change impacts on a larger scale. In lieu of a direct link to quantitative climate change impacts, it is possible to compare proposed project GHG emissions with other regional sources of GHG emissions to provide context for the proposed project impact.

Potential impacts related to climate change that may result from new sources of GHG emissions from the proposed project are discussed in this section. The proposed project construction and operation phase GHG emissions were calculated and analyzed in the *Air Quality and Greenhouse Gases Resource Analysis Report*, in Appendix D, and are summarized in Section 4.3 of this EIS.

The average annual direct GHG emissions associated with project construction would be 17,584 metric tons of carbon dioxide equivalent (CO_2e) per year. The construction phase is planned to last 5 years (for a total of 87,919 metric tons of CO_2e). For the operation phase, average annual direct GHG emissions would be 1,614 metric tons of CO_2e per year for 50 years (for a total of 80,708 metric tons of CO_2e).

The emission rate of each GHG pollutant type is multiplied by the global warming potential of the gas to compute the total **carbon dioxide equivalent (CO2e) emission rate**, which forms the foundation of the GHG analysis. Global warming potentials are based on the relative impact of each chemical compared to the same amount of carbon dioxide. More information on emission calculations is provided in Section 4.3 and Appendix D.

Per WAC 173.440.030, stationary sources of air pollutants in Washington are required to report annual actual GHG emissions if CO_2e emissions exceed 10,000 metric tons in any given year. The proposed project is located in Klickitat County, Washington. In 2019, applicable sources of GHG emissions in Klickitat County reported a total of 1,113,550 metric tons of actual CO_2e emissions[4] (Ecology 2022a). The proposed project's estimated construction phase annual CO_2e emissions would equal approximately 1.57% of the 2019 reported GHG emissions for Klickitat County, and operation phase annual CO_2e emissions would equal approximately 0.14% of the reported emissions in the County.

Additionally, a goal of the Applicant's proposed project is to store wind and solar generated energy during times of surplus and release energy during peak demand hours when fossil fuel generated energy would otherwise be used.

It is anticipated that the proposed project's GHG emissions would not appreciably contribute to climate change.

5.2.2 Effects of Climate Change on the Proposed Project

This section assesses adverse impacts of climate change on the proposed project's infrastructure and operations (operation phase of the proposed project only).

The proposed project will require an estimated 360 AFY of annual make-up water to replace losses due to evaporation and seepage that would not be replaced by the reservoirs capturing precipitation. This make-up water will be supplied by KPUD's Cliffs Water System under its existing municipal water right, which authorizes a maximum annual consumptive use quantity of 4,851 AFY. Refer to the *Surface and Groundwater Hydrology Resource Analysis Report*, in Appendix B, and Section 4.2, Water Resources, for more details.

[4] Applicable sources include stationary sources with greater than 10,000 metric tons of actual CO_2e emissions (WAC 173.440.030). This does not include other small stationary sources and mobile sources such as vehicle transportation. Therefore, actual CO_2e emissions are much higher than the sum of reported emissions.

The demand for make-up water depends primarily on evaporation, which varies based on the air temperature throughout the year, and precipitation captured by the reservoirs that will also vary throughout the year. The maximum monthly volume of make-up water needed is estimated to be 80 acre-feet in July. There will be greater evaporation in the future resulting from air temperatures increasing with climate change. Section 5.1.1 describes how annual average air temperatures will increase as a result of climate change, which raises surface water temperatures, thereby increasing evaporation rates from proposed project reservoirs. This would increase the amount of make-up water required. However, the Applicant's estimate of make-up water demand assumes a future evaporation rate greater than measured in the historical record to account for this anticipated future with climate change (FFP 2020a). Section 5.1.2 discusses how annual precipitation may exceed long term averages more frequently as climate change progresses. This could serve to partially offset increased needs for annual make-up water if greater precipitation is captured by the reservoirs.

Section 5.1.2 also discusses how climate change will contribute to reduced stream flow in the Columbia River Basin, thus increasing the scarcity of water as a regional resource. The proposed project requirements for make-up water would be provided by KPUD under an existing municipal water right that, with a priority date of March 19, 1969, pre-dates the Columbia River instream flow rule (WAC 173.563). The proposed project would not result in any new appropriation from the Columbia River or tributaries, and no impairment to Columbia River instream flows is identified. However, over time, the proposed project's make-up water needs may become part of increased regional competition for water as the resource becomes scarcer.

Section 5.1.4 describes how wildfires in the region are expected to increase in occurrence. Measures will be taken to manage the proposed project area to reduce potential fuel for a wildfire on the site (see Section 4.11 and the *Environmental Health Resource Analysis Report*, in Appendix I). Wildfires elsewhere in the region increase PM emissions and can result in decreased air quality near the proposed project during some times of the year, and these effects may increase with climate change. Operation of the proposed project may need to include some increased worker safety measures in the future.

5.3 Potential Effects of Climate Change by Resource

This section assesses the effects of these projected climate changes on resources analyzed in the EIS, relative to the proposed project and the No Action Alternative. Probable adverse environmental impacts from the proposed project that may be increased or decreased with climate change are the emphasis of the discussion in each of the sections below. No projected effects from climate change are anticipated to be relevant to the discussion of the following resource areas; therefore, they were not part of this analysis:

- Aesthetics/Visual Quality
- Land Use
- Public Services and Utilities
- Recreation
- Transportation
- Environmental Justice

5.3.1 Geology and Soils

Anticipated changes in temperature, precipitation, soil water content, streamflow, and vegetation have the potential to influence changes in patterns of erosion, sediment transport, and sediment deposition. Projected increases in annual precipitation could moderately increase soil moisture. However,

increasingly warm air temperatures and more frequent and severe summer droughts could dry soils and lead to widening gaps in rock and soil. Wind blowing over exposed dry soils could erode soil. The likely increase in winter and spring stream flows and heavy precipitation events could also lead to increased surface erosion.

It is not anticipated that these climate changes would alter the impact determinations for the proposed project or No Action Alternative that are discussed in Section 4.1.

5.3.2 Water Resources

Climate change is linked to multiple projected outcomes for streamflow in the Columbia River Basin, including higher average winter flows, earlier peak spring runoff, lower average summer flows, a longer period of low summer flows, or a combination of all of these. More frequent and severe summer droughts are also projected. The projected increase in precipitation during the fall and winter months would lead to higher and earlier winter and spring flows and would increase the potential for flooding. Climate change can substantially increase erosion and sediment transport in surface waters, which affects geomorphology as well as water quality. Increased temperatures will further degrade waterbodies, including those that are already impaired for water temperature in current conditions. Increased air and water temperatures in the future will also result in greater evaporation in reservoirs.

Increased heavy precipitation events in the fall and winter could lead to increased flood storage in wetlands and floodplains and these areas may stay wetter longer during the spring. It is not anticipated that these changes would alter the impact determinations for the proposed project related to wetlands and regulated buffers for wetlands and other non-wetland waters, because long-term operation of the proposed project would have minimal effect on these features.

As discussed in Section 5.1.2, flows in the Swale Creek watershed are dominated by winter storm events and snowmelt runoff, and climate change is expected to lead to higher winter flows and lower summer flows in the watershed. As noted in Section 4.2, construction of the upper reservoir for the proposed project would result in the permanent loss of portions of several streams that currently provide either intermittent or ephemeral drainage to Swale Creek. As a result, their loss could reduce the volume of surface flows to Swale Creek. However, given that they drain only a small portion of the 54,200-acre Swale Creek watershed, such impacts are expected to be minimal, and the Applicant has proposed development of mitigation measures to provide the greatest improvement to ecological functions in the broader Klickitat River watershed, within which Swale Creek is a tributary.

As noted in Section 5.2.2, the water balance analysis and the Applicant's estimate of make-up water demand assume a future evaporation rate greater than measured in the historical record to account for the anticipated future conditions with climate change (FFP 2020a). With appropriate control measures and monitoring programs in place, including measurement of the project's operating water balance with quantification of precipitation capture and leakage losses, changes related to future streamflow, hydrology, and evaporation are not anticipated to change the surface water hydrology impact determination discussed in Section 4.2.

Because the future proposed project reservoirs would have limited connection to groundwater, the impacts from reservoir operation under climate change are not expected to differ from the groundwater impact determinations for the proposed project discussed in Section 4.2.

As noted in Section 5.2.2, climate change will contribute to reduced stream flow in the Columbia River Basin, thus increasing the scarcity of water as a regional resource. Although no impacts on water supplies/rights or impairment to existing water supplies or water rights were identified in Section 4.2 as a

result of operation of the proposed project, over time with a changing climate, the proposed project's make-up water needs may become part of increased regional competition for water as the resource becomes scarcer.

Many water quality issues are connected to water temperature and sediment transport, and climate change will result in progressive degradation of water quality in Columbia River Basin surface waters over time. Reduced levels of dissolved oxygen and increased cyanobacterial blooms, microbial activity, and pH are all anticipated during summer low-flow periods. As discussed in Section 4.2, the proposed project is not expected to result in significant adverse impacts on water quality in surface waters because negligible seepage from the reservoirs is anticipated. Impacts that could occur would be further reduced and minimized by the implementation of appropriate control measures and water quality monitoring programs. With the implementation of appropriate measures and monitoring, climate change-induced reduction to water quality is not anticipated to change the impact determination discussed in Section 4.2 relative to water quality compliance in receiving waters.

The two reservoirs that would be constructed in the proposed project are anticipated to show a gradual degradation of water quality over time based on concentration of water quality constituents from evaporation, which would likely increase with climate change. The Applicant has proposed development of a reservoir water quality monitoring plan to ensure that dissolved solids, nutrients, and heavy metals in the reservoirs do not rise to concentrations that could adversely affect aquatic life or wildlife (FFP 2020a). Monitoring under the water quality monitoring plan would identify whether water quality conditions warrant additional protective measures, which could include modifying the system operation to incorporate active water treatment. With this program in place, the addition of climate change effects is not anticipated to change the reservoir water quality impact determination discussed in Section 4.2.

5.3.3 Air Quality

Air emissions from the proposed project that would be susceptible to change from climate change impacts are the construction phase PM_{10} and $PM_{2.5}$ emissions arising from fugitive dust. Other construction and operation phase emissions would be expected to be unchanged when considering climate change impacts. Construction phase fugitive dust emission magnitudes from activities such as earthmoving, material handling, and vehicle travel are dependent on the moisture content of the soil. Increases in summer warm and dry cycles are expected to occur as a result of climate change, thereby reducing summertime soil moisture (USACE et al. 2020). This reduction in soil moisture could increase fugitive dust emissions for construction activities occurring in the summertime.

A representative quantification of the effect of reduced soil moisture on fugitive dust emissions can be completed using the PM_{10} emissions factor methodology for bulldozing overburden in AP-42 Table 11.9-2. Although there are many other construction emission sources beyond bulldozing, this activity represents a significant portion of construction dust-generating activities and has a clear dependence on soil moisture. Using methodology from AP-42 Table 11.9-2, a 50% reduction in soil moisture would result in an increase in PM_{10} and $PM_{2.5}$ emissions by a factor of 2.64. Note the 50% reduction in summertime soil moisture used in this estimate is likely a very conservative assumption; climate change impacts that may occur in the 5-year time horizon of the construction phase would likely be much smaller.

Even considering the very conservative potential for increases in construction fugitive dust emissions related to reduced summertime soil moisture with climate change, the impact determinations discussed in Section 4.3 for the proposed project or No Action Alternative are not expected to change.

5.3.4 Energy Resources

The primary energy use during the operation phase of the proposed project is electricity sourced from connection to the public utility grid. Electricity from the public utility grid may be generated from a variety of sources including wind and solar generation, hydroelectric dams, and fossil fuel combustion. The effects of climate change may impact both annual average and seasonal variation in generation of wind, solar, and hydroelectric facilities as these can be affected by weather events, streamflow, and snowpack. This may change how the proposed project conducts pumping and generation cycles over time. Specific magnitudes of change are difficult to anticipate as climate change impacts may both increase and decrease wind, solar, and hydroelectric generation potentials depending on location and seasonality. The impacts of climate change are not expected to significantly change the availability of energy resources overall. Therefore, any change to the level of energy use is not expected to be significant. Additionally, the proposed project can cycle pumping and generation operations on demand, which would allow for dynamic adaptation to the availability of energy from the public utility grid.

Climate change may affect the proposed project's energy use, but it is not anticipated that climate change would alter the impact determinations for the proposed project or No Action Alternative that are discussed in Section 4.4.

5.3.5 Aquatic Species and Habitats

Anticipated changes in precipitation and air and water temperatures will continue to affect aquatic species and habitats in the future. However, there is significant uncertainty about the impacts of the changes. The warming water temperatures, increasing high winter flows, and changing spring and summer flows could increase the success of invasive fish species while presenting challenges for native fish and amphibians. Changes in streamflow will affect the lifecycles, and potentially the survival, of aquatic and semi-aquatic species. An increase in the frequency, intensity, and range of wildfires will likely lead to greater inputs of sediment into streams, which affects fish and aquatic habitats.

More frequent and severe summer droughts and longer periods of summer low flows could affect amphibian habitat and kill eggs and tadpoles if habitats dry earlier or faster. Conversely, increased heavy precipitation events in the fall and winter could lead to increased flood storage in wetlands and floodplains and these areas may stay wetter longer during the spring. This could also allow increased riparian and wetland growth and result in changes to habitat that amphibians may or may not be able to adapt to.

The expected shifts in the timing of precipitation and peak flows expected under climate change, as well as potential reductions in late summer baseflow, could affect aquatic habitat in the Swale Creek watershed. The portions of the Swale Creek system in Swale Valley are primarily an expression of the water table in the underlying aquifer and typically only flow during the winter and early spring. The increased frequency of precipitation projected for those seasons under climate change may extend the duration of flow in many streams and their tributaries in the springtime when many amphibians are breeding. Longer flow duration could contribute to increased plant growth along the banks and the extended presence of flowing water for aquatic species that require such conditions. However, if winter storm intensity also increases, the resulting higher flows could result in increased levels of sediment delivery and channel erosion, which could in turn reduce instream aquatic habitat.

Under current climate conditions, several portions of the stream system dry up during the summer, reducing surface connectivity and the availability of instream habitat for certain types of aquatic species (e.g., fish). Under climate change, such conditions are likely to become more widespread and of longer duration. Longer dry periods and reduction in water storage in the surficial aquifer could affect the growth

of riparian vegetation, with the potential for a reduction in shading along the stream channel and an increase in water temperature in the stream itself. Changes in the downstream portion of the watershed (i.e., Swale Canyon) due to climate change would likely include an increase in flashy high flows in the fall and winter due to predicted increases in precipitation and a decrease in the number and size of disconnected pools during the summer due to higher temperatures and reduced baseflow from the underlying aquifer.

Surface waters within the study area are not fish-bearing and adequate protection to the waters and shorelines of the Columbia River during operations is expected, consistent with local, state, and federal regulation. Although climate change will likely continue to affect aquatic species in the Columbia River, the proposed project would not involve work in the Columbia River. Nor would the project create new barriers to fish movement in the Columbia River. Therefore, it is not anticipated that these climate changes would alter the impact determinations for fish that are discussed for the proposed project in Section 4.6.

There is significant uncertainty about how climate change will affect amphibians and turtles in the study area; however, long-term operation of the proposed project is not expected to result in significant adverse impacts to amphibians and turtles and it is not anticipated that these climate changes would substantially alter the impact determination that is discussed in Section 4.6.

5.3.6 Terrestrial Species and Habitats

Warmer air temperatures and changes in precipitation (both increased summer droughts and heavier fall and winter precipitation) will continue to affect soil conditions, plant communities, insects, and wildlife. A longer growing season with warmer air temperatures and early winter and spring flows could result in benefits for some plant species (USFS 2019a). This could also increase the available habitat for some wildlife species. However, changes in the timing of when plants grow and bloom can affect the established symbiotic relationships between plants, insects, and animals in unpredictable ways (United Nations Environmental Programme 2018). These changes can also alter the migration patterns of wildlife as they seek to adapt and survive in changing habitats. Climate change may allow invasive species to become more common while native species are increasingly stressed (USGCRP 2018; USFS 2019b).

Increased heavy precipitation events in the fall and winter could lead to increased flood storage in wetlands and floodplains and these areas may stay wetter longer during the spring. This could also allow increased riparian and wetland vegetation to grow and may result in improved habitat for some invertebrates, insects, waterfowl, and other wildlife. However, a reduction in the presence of such habitat may occur in the summer due to increased air temperatures, evaporation, and reductions in recharge of the underlying surficial aquifer.

There is uncertainty about how climate change may affect shrub-steppe habitats, but changes in the plant species composition and distribution could occur (Yakama Nation 2019a). There will also likely be increased risks from invasive species and disturbance such as wildfire. The combined effects of disturbance from the proposed project and the effects of climate change in the vicinity could increase establishment and seed dispersal of invasive plants, which could then out-compete native and rare plant species. This could affect smooth desert parsley, which is culturally important to Tribes, and other rare plant species with the potential to be present in the study area. The Applicant plans to implement a Noxious Weed Management Plan and a VMMP (FFP 2020e), which is proposed to include ongoing measures to monitor changes and help control invasive species in the area of the operational project.

As explained above, there is uncertainty about how climate change will affect terrestrial species and habitats in the study area; however, based on the information available, it is not anticipated that these climate changes would substantially alter the impact determinations for the proposed project that are discussed in Section 4.7.

5.3.7 Cultural and Tribal Resources

As noted in Section 4.9 and described in more detail in the *Tribal Resources Analysis Report* in Appendix H, Tribal resources refers to the collective rights and access to traditional areas and times for gathering resources associated with a Tribe's sovereignty since time immemorial. It also includes inherent rights or formal treaty rights associated with usual and accustomed territories. In addition, Tribal resources include areas important to traditional cultural practices and the natural and cultural resources associated with those practices including plants, wildlife, or fish used for commercial, subsistence, and ceremonial purposes. Resources may also include archaeological or historic sites or TCPs associated with Tribal use and sites considered sacred by Tribes. Archaeological sites and historic properties are also considered. Tribes have commented on the proposed action, stating that impacts to plant and animal species and habitats would constitute impacts to Tribal resources. Sections 5.3.5 and 5.3.6 summarize how native aquatic, amphibious, and terrestrial species may be impacted by climate change. The air and water temperature increase, changes in streamflow, and increased wildfires have the potential to stress native fish, vegetation, wildlife, and their habitats. Tribes will be affected by these changes in natural resources due to climate change.

Plant gathering is an essential subsistence and cultural activity that is documented in ethnographic literature, Tribal legend and stories, and archaeological sites. Plants were historically and are currently gathered for food, medicine, and ritual uses, as well as raw material for tools, clothing, basketry and mats, and other uses. This was a common theme of letters Ecology received from the Tribes during the comment period on the scope of the EIS for the proposed project. The Rock Creek Band (Kah-Milt-Pah) of the Yakama Nation mentions "there are many culturally significant plants we gather on the north facing slope of this ridge site and also on top at Put-a-lish" and "the foods that are gathered here are our First Foods that we utilize for subsistence and ceremonial purposes" (Kah-Milt-Pah 2021).

Nez Perce Tribe's Climate Change Coordinator, Stefanie Krantz, has noted that climate change is causing seasonal shifts in the timing of plant life cycles, habitat changes including a tendency for plant communities to move upslope and to the north, and a shorter root gathering season with frequently lower quality roots being collected (Nez Perce Tribe Climate Change Task Force n.d.). The Yakama Nation Climate Action Plan notes "We have already observed earlier budding and flowering of plants and are concerned about potential impacts to migrating species, which depend upon the timing of these cycles. Changes in plant calendars also affect the timing of our feasts, which have occurred earlier over the years. Berries ripen quickly and die out faster than in the past, which affects not only our ability to gather, but also the broader food web" (Yakama Nation 2019a).

The Yakama Nation, Confederated Tribes of the Umatilla Indian Reservation, Nez Perce Tribe, and Confederated Bands of the Warm Springs Reservation of Oregon conducted a survey of climate change observations with Tribal members through the Columbia River Inter Tribal Fish Commission (CRITFC 2021a). They found that many members expressed concern for food supply continuity including the increasing risks from climate change to changing migration of birds and geese, game productivity and habitat changes, diminishment of the number of fish that would otherwise be available for Tribal harvest, and threats to food plants such as roots and berries.

The Yakama Nation Climate Action Plan states "Over the years to come, we may lose natural resources that are important to our culture and our heritage. Some of these losses may be irreversible" (Yakama Nation 2019a). Eric Quaempts, Natural Resources Program Manager with the Confederated Tribes of the Umatilla Indian Reservation, noted "If [the First Foods] shift in their distribution significantly, then it's kind of like they're leaving the community behind" (CRITFC 2021a).

These impacts from climate change would likely increase the significant adverse impacts to Tribal resources from the proposed project that are discussed in Section 4.9.

5.3.8 Environmental Health

As discussed in Section 5.1.4, wildfire occurrence is expected to increase in the region, which will also increase PM emissions. This could result in decreased air quality near the proposed project during some times of the year, and these effects may increase with climate change.

Proposed project operations would involve limited, if any, use of ignition sources outdoors and would not be expected to result in wildfire ignition. Project operations may need to include some increased worker safety measures during times of decreased air quality in the future. With appropriate worker safety training and best practices in place, the risk to physical safety would not be significant and it is not anticipated that climate change would alter the impact determinations that are discussed in Section 4.10.

6 Cumulative Impacts

Cumulative impacts are effects that would result from the incremental addition of the proposed project to the impacts from past, present, and reasonably foreseeable future actions. Cumulative impacts can result from individually minor, but collectively significant, actions that occur over time. The purpose of the cumulative impacts analysis is to ensure that decision-makers consider the full range of consequences for the proposed project under expected future conditions. Projected impacts related to climate change are evaluated in Chapter 5.

The cumulative impacts analysis was prepared in accordance with SEPA requirements (WAC 197.11.060) and also considered the federal Council on Environmental Quality approach for analyzing cumulative impacts. The following steps were used:

- Identify the resources that could be adversely affected by the proposed project (see Chapter 4 of this Draft EIS).
- Consider other actions in the same geographic study area for each resource.
- Consider other actions with effects during the same time period as effects from the proposed project, both during construction and operation.
- Analyze cumulative impacts using the best available data.

Key Findings of the Cumulative Impacts Analysis

Some other projects and actions are expected to happen in the same relevant geographic study areas and time frames as the proposed project.

The proposed project—in combination with contributing activities from other projects and actions—**would contribute to significant cumulative impacts related to Tribal and cultural resources**.

The proposed project—considered with reasonably foreseeable actions—could also cumulatively contribute to impacts that are not expected to be cumulatively significant, related to the following:

- Geology and soil resources
- Water resources
- GHG emissions
- Aquatic species and habitats
- Terrestrial species and habitats
- Traffic interference and congestion during construction

The geographic study area for cumulative impacts is primarily based on the study areas for the resources analyzed in the EIS. For some resources, the study area may extend farther to determine the incremental impacts to the resource within a larger community or landscape. The study areas for cumulative impacts are further described within the discussion of each resource in Section 6.2.

The future time frame for cumulative impacts considers actions that would have effects during the same time as effects of the proposed project. This EIS assumes construction of the proposed project would begin in mid-2025 and take approximately 5 years. The FERC hydropower license that would be required would authorize construction and operation for a term of up to 50 years. Therefore, the time frame for operations analyzed for the resources in this EIS is 2030 through 2075. The cumulative impact analysis also extends to the year 2075 in considering reasonably foreseeable future actions. This time frame conservatively accounts for future actions that may only be in the planning stages now but can reasonably be expected to be completed during the analysis period, as well as projects in more advanced planning or permitting phases.

Current conditions are a result of past and present actions. These current conditions in the study area were used as the baseline existing environmental condition for the resource analyses in this EIS, and are described as part of the affected environment for those resources. Therefore, past actions are not cumulatively considered again in this section for most resources. However, as described in the *Tribal Resources Analysis Report* (Appendix H), the Tribes have noted that the resources in the study area are part of a much larger integrated cultural network, and impacts can extend far beyond the study area in space and time. To analyze the full range of consequences of potential cumulative impacts to Tribal and cultural resources, some additional past and present actions are considered in this chapter.

Actions Included in the Cumulative Impacts Analysis

Reasonably foreseeable future actions were considered in this cumulative impacts analysis if they met at least one of the following criteria:

- Projects with funding secured for planned actions
- Projects currently undergoing SEPA review
- Projects that are underway or are in a permitting phase

Actions are included that have **geographic overlap** with the study areas for the effects analysis of each resource in Chapter 4.

Future actions were considered if they are likely to occur by the year 2075.

Past actions are only cumulatively considered for Tribal and cultural resources. Current conditions as a result of past actions are considered the baseline existing environmental condition for other resource analyses in this EIS.

6.1 Past, Present, and Reasonably Foreseeable Future Actions

Table 6.1-1 outlines the other projects and actions happening in the relevant geographic study areas and time frames. State and local sources were used to identify the actions for consideration (Ecology 2022b; Klickitat County 2022a, 2022b, 2022c; TID 2018). Comments that were received during scoping related to cumulative impacts were also considered. Only the actions that could impact resources considered in this Draft EIS were included in this analysis. The table notes the approximate location and status of these actions when such information was available. Existing and proposed energy projects identified by Klickitat County are also shown in Figure 6.1-1. The table also indicates the resources that are relevant to a consideration of impacts for that action in combination with the proposed project. Note these other projects would be required to complete separate project-specific SEPA environmental reviews and permitting, as appropriate.

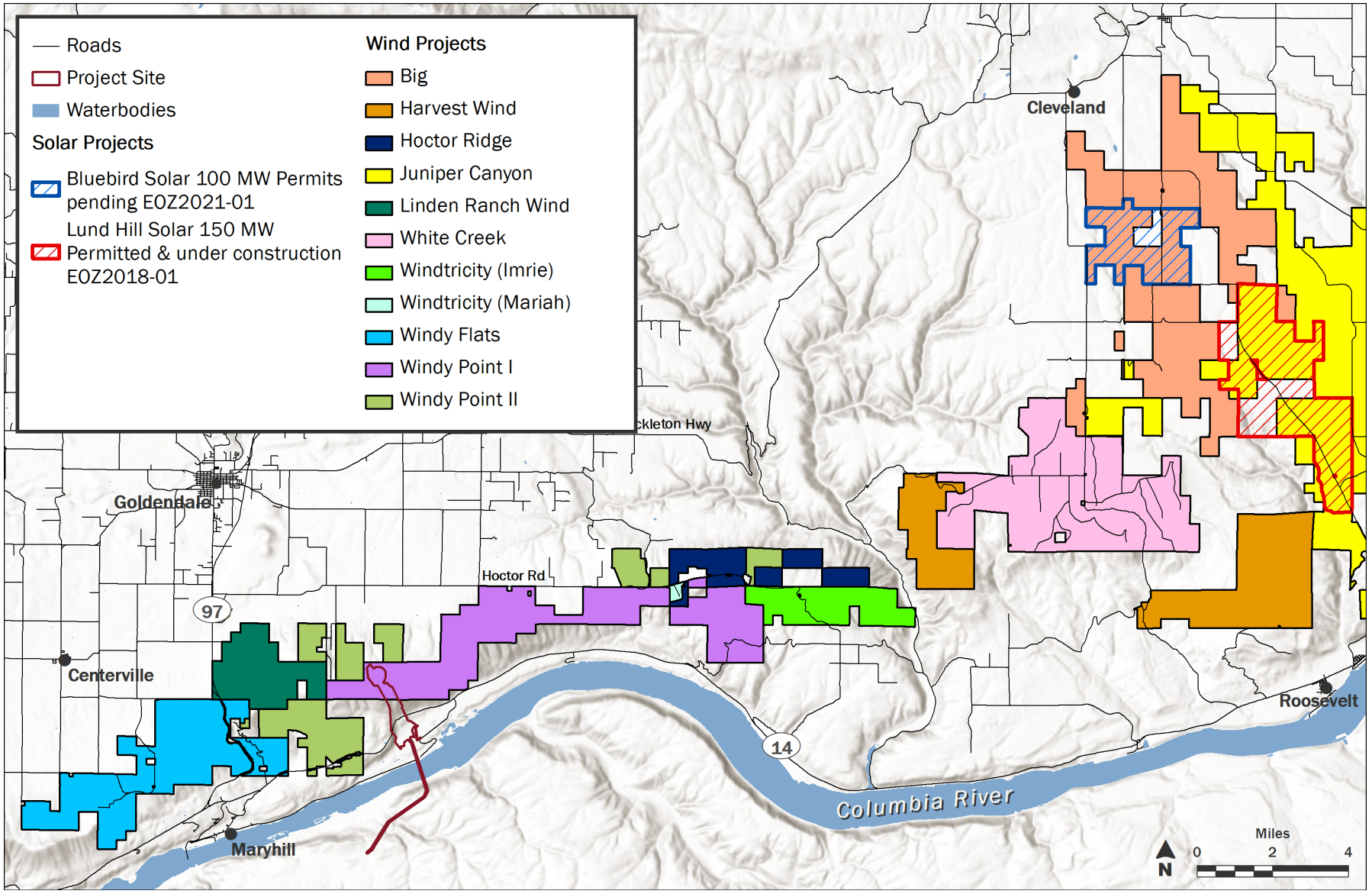
Table 6.1-1
Past, Present, and Reasonably Foreseeable Future Actions

PROJECT	SUMMARY OF APPLICABLE ACTIONS	LOCATION	STATUS	CUMULATIVE RESOURCE CONSIDERATIONS
Columbia Gorge Aluminum (CGA) Site-wide Cleanup	Ecology is working with liable parties NSC Smelter, LLC, and Lockheed Martin Corporation to investigate and clean up contamination on the former CGA smelter site. The Applicant is seeking a prospective purchaser consent decree for a portion of that site. Cleanup of the full CGA smelter site will proceed regardless of the proposed project.	Overlapping the lower footprint of the proposed project, and adjacent areas extending beyond the proposed project to the east	Future project in investigation/ planning stage; construction would be anticipated to begin between 2025 and 2027	Considered for cumulative effects in combination with the proposed project for all resources (see Sections 6.2.1 through 6.2.14)
Lund Hill Solar Energy Project	Aurora Solar, LLC, is constructing a solar energy generation facility on approximately 1,800 acres in unincorporated Klickitat County.	Approximately 24 miles northeast of the proposed project, approximately 6.5 miles south of Bickleton, Washington (see Figure 6.1-1)	Future project; construction began in 2020	Considered for cumulative effects in combination with the proposed project for energy resources, public services and utilities, and cultural and Tribal resources (see Sections 6.2.4, 6.2.5, and 6.2.9)
Bluebird Solar Project	Aurora Solar, LLC, proposes to develop a solar energy generation facility on approximately 670 acres in unincorporated Klickitat County adjacent to the existing Big Horn Wind Facility and near the Lund Hill Solar Energy Project that is under construction.	Approximately 25 miles northeast of the proposed project, approximately 5 miles south of Bickleton, Washington (see Figure 6.1-1)	Future project undergoing SEPA review (draft EIS published January 2022)	Considered for cumulative effects in combination with the proposed project for energy resources, public services and utilities, and cultural and Tribal resources (see Sections 6.2.4, 6.2.5, and 6.2.9)
Tuolumne Wind Project	The Turlock Irrigation District owns and operates a wind energy project consisting of 62 wind turbines.	Overlapping the upper footprint of the proposed project, and adjacent areas extending beyond the proposed project to the northeast and northwest	Past project, part of existing conditions	Considered for cumulative effects in combination with the proposed project for cultural and Tribal resources (see Section 6.2.9)
Windy Point I and II	Windy Point Partners, LLC, constructed two wind energy projects with a combined total of up to 149 wind turbines across several development areas (see Figure 6.1-1).	Overlapping the upper footprint of the proposed project, and adjacent areas extending beyond the proposed project to the north, northeast, and west (see Figure 6.1-1)	Past project, part of existing conditions	Considered for cumulative effects in combination with the proposed project for cultural and Tribal resources (see Section 6.2.9)

PROJECT	SUMMARY OF APPLICABLE ACTIONS	LOCATION	STATUS	CUMULATIVE RESOURCE CONSIDERATIONS
Linden Ranch Wind Farm	Northwest Wind Partners, LLC owns a wind energy project consisting of 28 wind turbines.	Approximately 4 miles northwest of the proposed project, south of Goldendale (see Figure 6.1-1)	Past project, part of existing conditions	Considered for cumulative effects in combination with the proposed project for cultural and Tribal resources (see Section 6.2.9)
Hoctor Ridge Wind Farm	Windtricity Ventures, LLC, constructed a wind energy project with up to 30 wind turbines.	Approximately 6 miles northeast of the proposed project (see Figure 6.1-1)	Past project, part of existing conditions	Considered for cumulative effects in combination with the proposed project for cultural and Tribal resources (see Section 6.2.9)
Columbia River Dams	The Columbia River has been highly developed since the 1930s, with a variety of federal and state agencies and private utilities operating dams on the river for a variety of uses. Today, USACE operates the dams closest to the proposed project, John Day Dam and The Dalles Dam.	John Day Dam is adjacent to the proposed project, its reservoir (Lake Umatilla) extends southeast; The Dalles Dam is 25 miles downstream, its reservoir (Lake Celilo) is south of the proposed project	Past projects, part of existing conditions; the closest Columbia River dams were built in 1957 (The Dalles Dam) and 1971 (John Day Dam)	Considered for cumulative effects in combination with the proposed project for cultural and Tribal resources (see Section 6.2.9)

Note: Some past and present completed projects are included in this table that are only considered for the potential cumulative impacts to Tribal and cultural resources.

Figure 6.1 1
Klickitat County Energy Projects Lease Boundaries



Data Source: Klickitat County 2022a
Note: Lease boundaries shown on the map may not reflect the footprints of construction or finished infrastructure in Klickitat County energy projects.

6.2 Cumulative Impacts by Resource

This section provides an overview of potential cumulative effects and a qualitative assessment of adverse impacts as relevant to each of the resources analyzed in the EIS.

6.2.1 Soils and Geology

The study area for geology and soils encompasses the aboveground limits of the proposed project plus a 250-foot buffer and extends belowground to the depth of proposed construction for the proposed project's facilities. There could be some impacts on slope stability from construction of the proposed project, but there is uncertainty related to the geologic conditions. Additional geotechnical studies and design updates proposed by the Applicant could further reduce these potential impacts. Construction would also remove vegetation and expose soils to stormwater and wind, increasing the potential for erosion. Many of the potential construction impacts could be reduced with the implementation of standard BMPs and design considerations proposed by the Applicant. Impacts from project operation would be limited to the potential for a local or regional earthquake that could cause liquefaction of fluvial deposits in the vicinity of the lower reservoir, potentially resulting in damage to the reservoir embankment or other project elements. Although local faults are unlikely to produce earthquakes, the study area is within the moderate shaking zone for a Cascadia Subduction Zone earthquake. No significant adverse impacts were determined to be related to geology and soil resources from construction or operation of the proposed project.

The CGA Site-wide Cleanup is currently estimated to begin between 2025 and 2027, potentially overlapping a portion of the proposed project's construction period and occurring on nearby areas; this project is considered in the cumulative impacts analysis for soils and geology. No other known future actions overlap the geographic study area for the soils and geology resource. Therefore, no other actions are considered in combination with the proposed project for this resource.

Ecology is currently working with liable parties NSC Smelter, LLC, and Lockheed Martin Corporation to investigate the contamination, evaluate cleanup alternatives, and develop a cleanup plan (Ecology 2022b), so details of the CGA Site-wide Cleanup are not yet known. Cleanup technologies typically considered for former aluminum smelter sites include excavation and off-site disposal, on-site containment, or treatment of contaminated soils and wastes. Technologies often considered for addressing groundwater contamination at similar sites include pump-and-treat systems, passive treatment systems, and monitored natural attenuation. Institutional controls, including restrictions on land use, use of groundwater, financial assurance, and maintenance of engineering controls are expected to be part of the cleanup plan. Ecology conducts periodic reviews to make sure the controls remain effective, and Ecology will ensure the CGA Site-wide Cleanup meets local, state, and federal requirements to protect human health and the environment.

The cleanup is expected to include controlled earth-moving construction activities that would include measures to reduce the possibility of exposing soils to erosion. Detailed remedial design documents, including monitoring plans, will be prepared for the cleanup and reviewed by Ecology to ensure that exposure to contamination is controlled during construction. The completed cleanup—as well as the WSI portion of the cleanup that would be completed under the PPCD for the proposed project—is expected to result in a reduction of exposure to contaminants in the environment as compared to current conditions. The site could experience a local or regional earthquake that could cause liquefaction of fluvial deposits, potentially resulting in damage to elements of the completed cleanup. However, the potential for liquefaction appears to be low in the areas impacted by contamination. Consideration of potential seismic impacts would be included in the engineering design of the cleanup actions.

Both Washington State law and the federal Clean Water Act require NPDES permitting to manage and limit pollutants in stormwater discharges during construction. These or related authorizations and others issued for the proposed project's construction and the CGA Site-wide Cleanup would require the preparation of sediment and erosion control plans and the implementation of BMPs (e.g., silt fencing, revegetation, and dust suppression measures) to reduce the occurrence of erosion or transport or migration of soil off site. Additional geotechnical studies for both projects could also result in design refinements to consider the seismic hazard and liquefaction and lateral spreading potential.

The proposed project, in combination with the contributing activities described above, could cumulatively contribute to impacts related to geology and soil resources.

6.2.2 Water Resources

The study area for water resources encompasses surface and groundwaters in the proposed project area as well as downstream ponds and streams, downgradient groundwater, and the adjacent and downstream Columbia River. The study area also includes wetlands and regulated waters within a 1,000-foot offset from the project area boundary. Construction would permanently impact 0.09 acre of wetlands and streams and 1.34 acres of stream buffer, as well as temporarily impact 0.06 acre of wetlands and streams and 0.89 acre of stream buffer. An initial fill volume of 7,640 acre-feet and an estimated 360 AFY of make-up water would be required from the Columbia River. Because such withdrawals would occur through an existing water right and authorized consumptive use, this activity would not impair water supplies or water rights. The proposed project's reservoirs would capture precipitation, and the system would result in some evaporation and leakage, but the proposed project would not substantially alter surface water hydrology. There would be some alteration to groundwater flow that will be monitored. Temporary increases in turbidity and pollutants in stormwater would be controlled to comply with water quality permit benchmarks and criteria. Water quality will likely degrade within the pumped storage system over time but would be managed, and is not expected to result in significant impacts on water quality in receiving waters. Through compliance with laws and with implementation of the mitigation measures described in Section 4.2, there would be no significant and unavoidable adverse impacts related to water resources from construction or operation of the proposed project.

The CGA Site-wide Cleanup project overlaps some of the surface and groundwaters considered in the proposed project area and within the adjacent and downstream Columbia Tributaries watershed considered in the proposed project study area for water resources. No other known future actions overlap the geographic study area for water resources; therefore, no other actions are considered in combination with the proposed project for this resource.

As noted in Section 6.2.1, although details of the CGA Site-wide Cleanup are not yet known, institutional controls—including, financial assurance, requirements to maintain engineering controls, restrictions on land use, and use of groundwater—will be part of the cleanup. Wetlands, groundwaters, and surface waters are being investigated to determine the extent of contamination. The cleanup is anticipated to result in wetland impacts and may include some new impervious surface areas, which could contribute to water quality or quantity impacts. However, these impacts would be minimized through compliance with regulatory requirements, and the completed cleanup is expected to result in a reduction of exposure to contaminants in the environment and overall improved water quality conditions.

Wetlands, regulated waters, and buffers would likely be cumulatively affected by the above actions that would result in long-term changes in erosion and sedimentation processes, water quality, and surface and groundwater flow patterns. Such impacts are expected to be mitigated by the requirements of

existing federal, state, and local regulatory programs and policies. The proposed project, in combination with the activities described above, could contribute to cumulative impacts on water resources.

6.2.3 Air Quality and Greenhouse Gases

The study area for air quality and GHG emissions includes the project footprint, areas traveled by construction vehicles and equipment within the project area, and immediately surrounding areas where odors may be perceptible or health risks could result from emissions. Emissions of some criteria pollutants, GHGs, and hazardous/toxic air pollutants would likely reach levels at which Washington State permits, approvals, and annual reporting may be required. Emissions would be below federal significance thresholds. No significant adverse impacts were determined to be related to air quality and GHG emissions from construction or operation of the proposed project.

The CGA Site-wide Cleanup is currently estimated to begin between 2025 and 2027, potentially overlapping a portion of the proposed project's construction time period and occurring on nearby areas; this project is considered in this cumulative impacts analysis.

Construction of the CGA Site-wide Cleanup at the same time and in similar areas as construction of the proposed project could result in additional construction-phase fugitive dust and vehicle or equipment emissions from activities such as earthmoving, material handling, and vehicle travel. Investigation of contamination and development of cleanup actions are underway, but the CGA Site-wide Cleanup would be expected to include measures to limit any dust or other emissions. This action would be expected to have GHG and air emissions and would be required to meet air quality standards, which may include state permitting actions and/or implementation of mitigation strategies. Mitigation strategies such as use of BMPs to reduce fugitive dust and preferential selection of efficient construction equipment and vehicles are expected to facilitate further reduction of potential effects on air quality and GHG emissions. Mitigation would be considered by regulatory agencies during permitting and may be included as a condition or requirement of permits and approvals.

The proposed project, in combination with the contributing activities described above, would not contribute to cumulative air quality impacts but could have some cumulative contributions to GHG emissions.

6.2.4 Energy Resources

The study area for energy resources includes the proposed project area, local energy sources, and a broader consideration of electricity resources at the regional level within the Columbia River Basin. Local energy resources would not be constrained by construction and operation of the proposed project. Energy use would be consistent with local and regional energy plans and would not impact adjacent uses of energy. No significant adverse impacts were determined to be related to energy resources from construction or operation of the proposed project.

The CGA Site-wide Cleanup is currently estimated to begin between 2025 and 2027, potentially overlapping a portion of the proposed project's construction period and requiring some energy during the same time. The Lund Hill Solar Energy Project and Bluebird Solar Project would be 150- MW and 100-MW solar energy generation facilities. Klickitat County currently has a mix of energy generating facilities, listed in the *Energy Resource Analysis Report*, in Appendix E. Existing energy projects were considered as part of the baseline existing environmental condition for the energy analyses in Section 4.4 of this EIS.

Energy use during construction of the cleanup would likely consist of fuel combustion to operate haul trucks, vehicles, and generators, and some elements powered by connection to the electrical grid,

including equipment such as lights and lifts. The completed cleanup action is not expected to have substantial energy requirements.

The solar projects were sited within the Klickitat County Energy Overlay Zone. The Energy Overlay Zone is intended to indicate areas deemed suitable for wind turbines and solar energy facilities. Klickitat County has undergone substantial renewable energy development since the Energy Overlay Zone was established. As KPUD noted in their scoping comments for this EIS, it is "likely this area has been studied to a greater extent than any other area of the Pacific Northwest for its suitability for energy project development" (KPUD 2021b).

As the regional population continues to grow, residential, commercial, and industrial power use are also projected to result in a growth in electricity demand (NWPCC 2016). Studies have shown a current and increasing energy resource shortfall in the region that points to the need driving construction of a variety of additional energy generation facilities (e.g., E3 2019; NWPCC 2019). The Northwest Power and Conservation Council is currently updating the Northwest Conservation and Electric Power Plan—a regional power plan based on the Northwest Power Act, with the goal of balancing the Pacific Northwest's environment and energy needs. A draft of the updated plan, published in September 2021, focuses on regional goals for decarbonization of electricity generation, the reduced economic viability of coal generation, and increased economic viability of the wind and solar generation (NWPCC 2021). The plan outlines strategies for energy efficiency, at least 3,500 MW of energy generation from renewable resources, and introduction of low-cost demand response resources (also known as peaking generation, or resources for power generation in periods of high demand).

Fuel and electrical energy use during construction of the proposed project and the actions above would not be expected to be an amount that would cumulatively affect locally available energy resources. Energy generation by the solar projects would have large fluctuations. The Applicant for the proposed project proposes to purchase electrical power from grid sources during periods of low demand and provide energy generation during peak demand hours to sell electricity back to the grid for energy supply stability. Therefore, the proposed project and other solar projects would be compatible with each other, as well as with adjacent existing energy infrastructure. The proposed project is expected to operate based on regional electricity demand and dispatch of the various regional energy generating sources and, in combination with the contributing activities described above, is not anticipated to cumulatively contribute to impacts on energy resources.

6.2.5 Public Services and Utilities

The study area for public services is limited to those service areas serving the project area. The study area for utility providers is the entirety of Klickitat County and, for solid waste, includes landfills within Wasco and The Dalles, Oregon, that could be used to dispose of contaminated material. Some public services could be temporarily disrupted by the proposed project with construction-related traffic or road detours throughout the 5-year period of construction, but no significant adverse impacts were determined to be related to public services and utilities from construction or operation of the proposed project.

The CGA Site-wide Cleanup is estimated to begin between 2025 and 2027, potentially overlapping a portion of the proposed project's construction period and occurring on nearby areas that may include some of the same public services and utilities. The Lund Hill Solar Energy Project and Bluebird Solar Project would be more distant, approximately 24 and 25 miles northeast of the proposed project, in unincorporated Klickitat County and only overlapping the larger study area for utility providers.

Construction of the CGA Site-wide Cleanup at the same time and in similar areas as the construction of the proposed project would likely result in increased use of disposal facilities that are capable of receiving contaminated soil, such as Roosevelt Regional Landfill in Klickitat County, the Wasco County Landfill in The Dalles, Oregon, or Chemical Waste Management in Arlington, Oregon. These facilities are expected to have sufficient capacity to receive contaminated soil associated with the cleanup efforts, subject to facility permit requirements, actual quantities of contaminated soil to be excavated, and economic factors.

Construction for the cleanup could also result in potential intermittent or occasional increases in demand on public services such as fire, police, hospital, and emergency services, but the projects are not expected to exceed the existing capacity of these services.

The solar energy projects would include construction of new utility infrastructure, new connections, and potentially some relocation of existing infrastructure for electrical transmission. Consistency with comprehensive plans and zoning would ensure that adequate capacity for public services and utilities is available and Klickitat County utility providers are involved with planning for all the energy projects. Disruption of utility lines can be predicted and is expected to be coordinated with service providers, local agencies, and the entities affected. Therefore, these activities would not likely contribute to cumulative impacts.

Proposed mitigation measures for transportation (see Section 6.2.13) would minimize impacts to public service providers from construction of the proposed project and the other projects. The proposed project, in combination with the activities described above, would not contribute to cumulative impacts on public services and utilities.

6.2.6 Aquatic Species and Habitats

The study area for aquatic species and habitats includes areas of surface water in or near the proposed project area that provide aquatic habitat. It also includes key features within surface waters and aquatic habitats that are connected to waters flowing from the project footprint. Construction would result in the permanent loss of 0.09 acre of existing aquatic habitat and the temporary disturbance of 0.06 acre of aquatic habitat, primarily in the Swale Creek watershed. Infrequent mortality, injury, and temporary disturbance to amphibians and turtles could occur during the 5-year construction period. A permanent or multi-year reduction in ecological function would cause indirect effects on aquatic habitat and fish in the Swale Creek watershed. Aquatic habitat and species in the Columbia River are not anticipated to be affected by the proposed project. Through compliance with laws and with implementation of the mitigation measures described in Section 4.6, there would be no significant and unavoidable adverse impacts related to aquatic species and habitats from construction or operation of the proposed project.

The CGA Site-wide Cleanup overlaps some of the surface waters considered in the proposed project area and downstream surface waters and aquatic habitats that are connected to waters flowing from the project footprint. No other known future actions overlap the geographic study area for aquatic species and habitats; therefore, no other actions are considered in combination with the proposed project for this resource.

While the CGA Site-wide Cleanup is anticipated to improve overall conditions for aquatic species and habitats, construction could cause temporary and permanent impacts from water diversions, cut and fill, vegetation disturbance, and increased noise and vibration. These could lead to additional mortality, injury, and temporary disturbance to amphibians and turtles, as well as potential temporary fish injury or disruption if the cleanup project were to affect the Columbia River.

The proposed project, in combination with the activities described above, could contribute to cumulative impacts on aquatic species and habitats.

6.2.7 Terrestrial Species and Habitats

The study area for terrestrial species and habitats includes the proposed project area plus a 0.6-mile offset to include the typical range for wildlife. The study area also includes vertical air space up to 650 feet above ground that is typically used by birds, bats, and other flying species, and a vertical distance of up to 6.5 feet below ground that may be used by burrowing species. Nearby nesting areas of sensitive bird and bat species that frequently use air space and resources found in the proposed project footprint are also considered to be part of the study area.

Direct and indirect impacts on special status species—including golden eagle, little brown bat, smooth desert parsley, and other rare plants—would be addressed through permit requirements and mitigation measures to reduce impacts. Construction would result in the permanent loss of 193.6 acres of existing habitat and the temporary disturbance of 54.3 acres of habitat. Operation would indirectly impact habitat function and quality for some species. Plants, mammals, reptiles, and invertebrates could experience mortality and birds could experience disturbance during the 5-year construction period, but species viability would not be adversely affected. The analysis found the proposed project would have no significant and unavoidable adverse impacts related to terrestrial species and habitats, with inclusion of the mitigation measures described in Section 4.7 to reduce significant impacts.

The CGA Site-wide Cleanup is estimated to begin between 2025 and 2027, potentially overlapping a portion of the proposed project's construction period and occurring on nearby areas. No other known future actions overlap the geographic study area for terrestrial species and habitats; therefore, no other actions are considered in combination with the proposed project for this resource.

Much of the CGA Site-wide Cleanup site is similar to the study area in the vicinity of the lower reservoir for the proposed project, composed of previously developed or disturbed land and introduced/invasive habitat types. While the cleanup is anticipated to improve conditions for wildlife and their habitats, construction could cause impacts to existing vegetation and increased noise and vibration that could lead to additional direct and indirect impacts on plants, mammals, reptiles, invertebrates, and special status species. The completed cleanup is expected to result in a reduction of exposure to contaminants in the environment as compared to current conditions.

The proposed project, in combination with the activities described above, could contribute to cumulative impacts on terrestrial species and habitats.

6.2.8 Aesthetics/Visual Quality

The study area for the aesthetics and visual quality analysis included the Columbia Hills and Columbia River viewsheds as shown in Figure 4.8-1 in Section 4.8. No significant adverse impacts to non-Tribal viewers were determined to be related to aesthetics and visual quality from construction or operation of the proposed project. Impacts to Tribal viewers are discussed in Section 4.9 and the *Tribal Resources Analysis Report* (Appendix H).

The other action within the viewsheds for the study area and considered in this cumulative impacts analysis is the CGA Site-wide Cleanup. No other known future actions overlap the geographic study area for aesthetics and visual quality; therefore, no other actions are considered in combination with the proposed project for this resource.

The CGA Site-wide Cleanup process may cause temporary visual changes during construction that could be disruptive to the natural harmony, cultural order, and coherence and may affect viewers intermittently over the duration of the cleanup. Visual changes would be expected to be similar to the activities discussed for the proposed project, and the completed cleanup would not be expected to impact aesthetics and visual quality.

The proposed project, in combination with the activities described above, would not cumulatively contribute to impacts related to aesthetics and visual quality. Cumulative impacts to Tribal viewers are discussed in Section 6.2.9.

6.2.9 Cultural and Tribal Resources

As discussed in Section 4.9, Tribal resources refers to the collective rights and access to traditional areas and times for gathering resources associated with an Indian Tribe's sovereignty since time immemorial. It also includes inherent rights or formal treaty rights associated with usual and accustomed territories or formal treaty rights. In addition, Tribal resources includes areas important to traditional cultural practices and the natural and cultural resources associated with those practices including plants, wildlife, or fish used for commercial, subsistence, and ceremonial purposes.

Resources may also include archaeological or historic sites or TCPs associated with Tribal use and sites considered sacred by Tribes. Cultural resources are often grouped together as "historic properties." Historic properties are prehistoric or historic districts as well as historic and archaeological sites, structures, or objects that are listed in (or eligible for listing in) preservation registers such as the NRHP, the Washington Heritage Register, or local preservation registers. Tribal resources, archaeological sites, TCPs, and natural resources often can be interconnected and overlapping as Tribal resources.

The study area for Tribal and cultural resources is the geographic extent of potential direct and indirect impacts, which could extend well beyond the proposed project footprint. Tribal communities have been connected to the places and resources of the study area and the larger Columbia River Basin since time immemorial, and Tribal and cultural resources have been repeatedly impacted by past actions. To analyze the full range of consequences of potential cumulative impacts to Tribal and cultural resources, some past and present actions from Table 6.2-1 are considered in this section. The following actions are considered in combination with the proposed project for Tribal and cultural resources:

- Future actions considered include the CGA Site-wide Cleanup, the Lund Hill Solar Energy Project, and the Bluebird Solar Project.
- Past actions considered include the Tuolumne Wind Project, Windy Point I and II, the Hoctor Ridge/Windtricity Wind Farm, the Linden Ranch Wind Farm, and modifications of the Columbia River such as the history of dams and reservoirs.

The analysis of impacts to Tribal resources differs in its approach when compared to the impact analysis for other natural resources. Impacts to natural resources were assessed in Chapter 4 to determine if the project would have significant impacts and whether or not they could be mitigated. The analysis for Tribal resources also considered the Tribes' unique and powerful connection to and reliance on cultural and natural resources. As a result of this connection, Tribes hold a deep intimate knowledge and understanding of the ecosystem, often referred to as Tribal Ecological Knowledge. In order to honor the Tribes' perspective, the analysis considers all identified impacts to natural resources and cultural resources, considers the unique perspectives and specific impacts to the Tribes, and adds cultural context when evaluating impacts. The analysis found the proposed project would have significant and unavoidable adverse impacts related to Tribal and cultural resources. The Applicant for the proposed project has proposed mitigation for some impacts but the Tribes have indicated that this is not sufficient.

The assessment of past human impacts on Tribal and cultural resources includes the changes to the Columbia River that have resulted in the current condition where a variety of federal and state agencies and private utilities operate dams on the river for a variety of uses, including energy production. The closest Columbia River dams to the proposed project are The Dalles Dam, built in 1957, and John Day Dam, built in 1971 (USACE 2022). When they were built, the Columbia River dams inundated "important Indian fishing places," and they currently "impede salmon migration to 2,800 miles of fish habitat" (CRITFC 2021b). The reservoirs behind dams near the proposed project submerged numerous villages, as well as important cultural sites such as petroglyphs. When Celilo Falls downstream of the proposed project area was inundated behind The Dalles Dam, villages and important fishing, trading, and cultural sites were destroyed and the loss "still reverberates in the heart of every Native American who ever fished or lived by it" (CRITFC 2021c). Today, reservoir level fluctuations and flow modifications associated with operation of the Columbia River dams can increase the risk of exposure, erosion, and looting of remaining cultural and archaeological sites.

Today the Columbia River dams also continue to impede native fish and aquatic species migrations, alter water temperature and quality, and form reservoirs that can allow invasive species to prey on native species. The Columbia River Inter-Tribal Fish Commission notes "Salmon are one of the most important aspects of tribal culture" and as of 1998, "Human development in the Columbia River Basin reduced the area available to salmon and steelhead to just 73,000 square miles. Of all salmon and steelhead habitat in the Basin, 55% of the area and 31% of the stream miles have been eliminated by dam construction" (CRITFC 2021b).

The past wind farm projects include ground disturbance that could increase the chances of exposure, erosion, and looting of archaeological sites. The wind farms also limit Tribal access to sites for cultural practices and gathering of natural resources and contribute to visual changes in the natural state of the landscape that can interrupt Tribal cultural practices and impact the expression of Tribal spirituality. The impact of past wind farm actions such as the Tuolumne Wind Project were noted in the Kah-Milt-Pah (Rock Creek Band) scoping comments: "Our people have already endured the construction of wind farms in the Put-a-lish over decade ago on our sacred site and root gathering fields" (Kah-Milt-Pah 2021). Tribes have commented that previous agreements to preserve Tribal access to sacred locations have not been honored once developments are in place.

The future solar energy projects are expected to impact shrub-steppe, native perennial grasslands, and other wildlife habitats; can impede migration of species such as deer and elk; can cover grounds used by Tribes for plant and root gathering; can result in visual quality impacts on Tribal viewers; and can impede traditional Tribal rituals, such as ceremonies and vision quests. In comments on the draft EIS for the Lund Hill Solar Energy Project, the Yakama Nation stated the area of that action includes TCPs and other important sites, and "the landscape was an integral part of Native American lifeways at this location" (Yakama Nation 2019b).

Together, the wind and solar projects represent substantial changes to the culturally important landscape, visual changes in the natural state of the landscape that can interrupt Tribal cultural practices and impact the expression of Tribal spirituality, as well as physical barriers to areas where cultural activities took place. Archaeological sites and TCPs are non-renewable resources; impacts to these resources would contribute to significant cumulative impacts from past and future projects.

In their scoping comments for the Applicant's proposed project, Yakama Nation stated that it "cumulatively adds to other energy infrastructure, including hydro-electric dams and utility-scale wind turbine facilities, that devastate and destroy Yakama Nation's traditional fishing sites, villages, burial

sites, ceremonial gathering places, root and medicine harvests, and cultural landmarks up and down the Columbia River" (Yakama Nation 2021).

Although complete details of the CGA Site-wide Cleanup are not yet known, during construction the cleanup is also anticipated to result in ground disturbance and temporary restrictions to access, temporary degradation of visual quality for Tribal viewers, and noise. These impacts could also contribute to significant cumulative impacts.

The proposed project, in combination with the activities described above, would contribute to cumulative impacts on Tribal and cultural resources.

6.2.10 Environmental Health

The study area for environmental health encompasses the proposed project area, as well as downgradient groundwaters, downstream ponds or streams, and the Columbia River adjacent to and downstream of the project footprint. Construction and operation of the proposed project could cause possible spills, discharge, or disturbance of hazardous or contaminated materials. Completing the proposed WSI removal within the former CGA smelter site would permanently remove a large quantity of contaminated materials and thereby achieve a long-term environmental benefit. Noise and vibration are expected to be temporary and occur in areas where very few people could be affected. There would be an extremely low probability for failure of a reservoir. Required permits, plans, and monitoring would further reduce any associated risks for environmental health. No significant adverse impacts were determined to be related to environmental health from construction or operation of the proposed project.

The CGA Site-wide Cleanup overlaps some of the surface and groundwaters considered in the proposed project area and within the adjacent and downstream Columbia Tributaries watershed considered in the proposed project study area for environmental health. No other known future actions overlap the geographic study area for environmental health; therefore, no other actions are considered in combination with the proposed project for this resource.

As previously described, although complete details of the CGA Site-wide Cleanup are not yet known, it is anticipated to result in a reduction of exposure to contaminants in the environment and overall improved soil and water quality conditions. Similar to the proposed project, noise and vibration during cleanup are expected to be temporary and occur in areas where very few people could be affected. Construction of the cleanup could cause possible spills, discharge, or disturbance of hazardous or contaminated materials. However, these impacts would be minimized through compliance with regulatory requirements and BMPs.

With the controls and measures assumed to be implemented, the proposed project, in combination with the activities described above, would not contribute to cumulative impacts on environmental health.

6.2.11 Land Use

The study area for land use includes lands within the boundaries of the project site where land uses may be impacted or altered. The project area would convert from undeveloped space and previous industrial operations with some existing infrastructure to a utility-scale pumped hydropower facility. The project would change an existing land use and would require a conditional use permit from Klickitat County based on the existing Industrial Park, Extensive Agriculture, and Open Space zoning, but the proposed project would not require a modification or amendment to an existing zoning, planning, or policy document. No significant adverse impacts were determined to be related to land use from construction or operation of the proposed project.

The CGA Site-wide Cleanup would overlap the study area for land use and is expected to occur on nearby areas that include some of the same zoning and land use considerations; therefore, this project is considered in this cumulative impacts analysis.

As noted in Section 6.2.1, although details of the CGA Site-wide Cleanup are not yet known, institutional controls and land use restrictions are expected to be part of the cleanup plan. Most of the investigation areas were part of past industrial operations and the majority of the cleanup site is zoned as Industrial Park, with smaller areas zoned Extensive Agriculture and Open Space (Tetra Tech et al. 2021). The cleanup is also within a treaty-defined usual and accustomed fishing area of the Yakama Nation. Cleanup soil screening levels will likely be applied based on the existing zoning for each area of the cleanup, and potential changes to zoning and cleanup levels will be revisited as appropriate during the feasibility study stage of the cleanup (Tetra Tech et al. 2021). It is assumed that long-term stewardship measures and land-use restrictions will be included in the final CGA Site-wide Cleanup.

The proposed project and the CGA Site-wide Cleanup would be compatible with each other, as well as adjacent energy infrastructure such as existing transmission lines, substations, and wind energy infrastructure. Other adjacent land uses such as agriculture and transportation would not be impacted by land use in the completed cleanup or operation of the proposed project.

The proposed project, in combination with the contributing activities described above, would not cumulatively contribute to impacts related to land use.

6.2.12 Recreation

The proposed project occurs on private lands with no public recreational facilities and limited recreational opportunities due to current and previous industrial land uses, the previous CGA smelter, and existing wind turbines. The study area for the recreation analysis also looks at public recreational opportunities within 10 miles of the proposed project, and impacts to recreational opportunities and access in that larger area would consist of only temporary and intermittent traffic and access changes during construction. No significant adverse impacts were determined to be related to recreation from construction or operation of the proposed project.

The CGA Site-wide Cleanup is currently estimated to begin between 2025 and 2027, potentially overlapping a portion of the proposed project's construction time period and occurring on nearby areas; this project is considered in this cumulative impacts analysis.

Construction of the CGA Site-wide Cleanup at the same time and in similar areas as construction of the proposed project would not contribute to cumulative impacts within the immediate project areas because there are no recreational facilities in the project areas. Investigation of contamination and development of cleanup actions are underway, but the CGA Site-wide Cleanup would be expected to include measures to limit any dust or other emissions that could otherwise contribute to disturbances to users at the Cliffs Park, Railroad Island Park, and Cliffside Launch recreational areas within 1 mile of project construction.

The study area also encompasses a larger 10-mile radius from the project site and includes the 14 private and publicly accessible recreational opportunities discussed in Section 4.12. The CGA Site-wide Cleanup could require temporary and intermittent traffic and access changes that could affect some of the same recreational opportunities and facilities in the larger study area as those temporarily affected by the proposed project. There may be additional traffic delays that would affect travelers along SR 14, U.S. Route 97, and Interstate 84. Hoctor Road could also be subject to detours during construction of the CGA Site-wide Cleanup. These delays and detours may cause short-term impacts to travelers to Maryhill State Park, Cliffs Park, Railroad Island Park, Cliffside Launch, and the Gifford Pinchot National Forest.

Recreational opportunities that may be impacted at these sites include camping, picnicking, boating, fishing, hiking, wildlife viewing, and water sports.

Section 6.2.13 discusses measures that will be implemented to further analyze construction traffic impacts, and the Applicant has also proposed mitigation measures to coordinate and manage construction traffic. Based on those measures, the proposed project, in combination with the contributing activities described above, would not contribute to cumulative effects on recreation.

6.2.13 Transportation

The transportation analysis study area consists of regional and local highways, roads, and public transportation, as well as any construction and detour routes for the proposed project. Temporary road closures and detours would occur throughout the 5-year period of construction of the proposed project, but no significant adverse impacts were determined to be related to transportation from construction or operation of the proposed project.

The CGA Site-wide Cleanup is currently estimated to begin between 2025 and 2027, potentially overlapping a portion of the proposed project's construction period and occurring on nearby areas that may require the same highways, local roads, and potential for road detours; this project is considered in this cumulative impacts analysis.

Construction of the CGA Site-wide Cleanup at the same time and in similar areas as the construction of the proposed project would likely result in increased traffic during the overlapping construction periods and could contribute to increased congestion on local roadways or increased need for temporary road closures and detours. Investigation of contamination and development of cleanup actions are underway, but the CGA Site-wide Cleanup may also require transportation of excavated materials to the same or similar suitable off-site disposal locations that may be used for materials from the WSI in the proposed project. This may result in additional truck trips on regional highway routes to and from the facilities that could potentially accept contaminated soil.

WSDOT requested that a Transportation Impact Analysis be completed for the proposed project to further analyze construction traffic impacts. If it is determined that improvements to SR 14 or any other WSDOT facilities are needed, the Applicant would work directly with WSDOT on the design, approval, and inspection of those improvements. The Applicant has also proposed mitigation measures to coordinate and manage construction traffic. It is anticipated that as the investigation of contamination and development of cleanup actions proceed for both the proposed project and the CGA Site-wide Cleanup, these cumulative impacts will be considered by regulatory agencies during permitting for the proposed project and the CGA Site-wide Cleanup. Specific permit conditions and mitigation actions would be confirmed by regulatory agencies and implemented with, or as part of, the required permits, plans, and approvals.

The proposed project, in combination with the contributing activities described above, could contribute to cumulative effects with respect to traffic interference and congestion during construction.

6.2.14 Environmental Justice

The study area for environmental justice includes people living within 2 miles of the project footprint within Washington State. The analysis found the proposed project would have no significant and unavoidable adverse impacts related to environmental justice. The project would not have a disproportionate impact on communities of color or low-income populations.

The CGA Site-wide Cleanup will occur on areas adjacent to the proposed project. This action would intersect the same Census block group as the geographic study area for environmental justice, Block Group 3 in Census Tract 9501. When compared to Klickitat County as a whole, this block group has a greater percentage of people of color and a greater percentage of low-income residents (ACS 2019). The study area was not identified as an overburdened community based on review of the Environmental Health Disparities layer of the Washington Tracking Network (WTN 2022).

There are no homes in or immediately adjacent to the area of the CGA Site-wide Cleanup, and direct or indirect significant adverse impacts on people would not be expected from construction or from the completed cleanup.

The proposed project, in combination with the activities described above, would not contribute to cumulative impacts related to environmental justice or impacts disproportionately affecting communities of color or low-income populations.

7 Consultation and Coordination

This section describes how information was shared during development of this Draft EIS. From the start of the process through the release of the Draft EIS, Ecology has used several methods to reach out to Tribes, stakeholders, and interested parties with project updates and opportunities to engage in the process. The SEPA review process helps agency decision-makers, applicants, and the public understand how the entire proposal will affect the environment.

Several opportunities are being provided for the public to find out more about the Draft EIS and provide comments. Details can be found in the Fact Sheet at the start of this EIS.

7.1 Environmental Impact Statement Scoping Process

Ecology issued a Determination of Significance on January 14, 2021, and opened a comment period on the scope of the SEPA EIS for the Applicant's proposed project. The Determination of Significance and Scoping Notice for the EIS initiated Ecology's environmental review process. The scoping comment period was held from January 14 through February 12, 2021, and included two online public meetings held on January 27 and February 3, 2021. Additional details on the scoping process and the comments received are in the *Scoping Summary Report* in Appendix A (Anchor QEA 2021).

Ecology invited Tribes, agencies, members of the public, and stakeholders to participate in the scoping process and provide comments. During the scoping period, Ecology accepted scoping comments by mail, via online form, and verbally during the online public meetings.

Scoping Outreach Summary

- **Determination of Significance and Scoping Notice** posted in the SEPA register on January 14, 2021
- **Legal notices** published in the *Goldendale Sentinel*, *Tri-City Herald*, and *The Columbian*
- **News release** published on January 14, 2021
- **Social media post** on Twitter
- **Postcard** sent to subscribers of a mailing list
- **Announcement** published on Ecology's Public Input and Events Listing website
- **Announcement** posted on Ecology's project website
- **Email** sent to Tribes in Washington, Idaho, and Oregon
- **Phone calls** to Tribal Natural Resource Directors of Confederated Tribes and Bands of the Yakama Nation, Confederated Tribes of the Umatilla Indian Reservation, Nez Perce Tribe, Confederated Tribes of the Colville Reservation, and Confederated Bands of the Warm Springs Reservation of Oregon
- **Phone calls** to local agency contacts including county commissioners and staff, the mayor of Goldendale, and Public Utility District No. 1 of Klickitat County
- **Email** to state agencies and legislators
- **Phone calls** to state legislators for the 14th and 15th districts

7.2 Tribal Coordination

During scoping, Ecology sent emails to Tribes in Washington, Oregon, and Idaho to notify them about scoping. Government-to-government consultation was offered to the Yakama Nation, Confederated Tribes of the Umatilla Indian Reservation, Nez Perce Tribe, and Confederated Bands of the Warm Springs Reservation of Oregon. After scoping, Ecology repeated this invitation for consultation.

Ecology staff also offered regular technical meetings to Tribal cultural and natural resources staff. Yakama Nation staff accepted the offer and met with Ecology staff every few weeks from May 2021 through March 2022. These meetings provided Ecology an opportunity to discuss project details, gain information from the Tribe about project impacts, and ensure that the Tribe's perspective was captured in the Draft EIS. Ecology plans to continue these meetings with Yakama Nation staff, as needed, and Ecology has continued to reach out to the other three Tribes that were offered government-to-government consultation, to encourage a similar level of participation throughout development of the EIS.

During development of this Draft EIS, Ecology offered these four Tribes an opportunity to review draft sections of the *Tribal Resources Analysis Report* (Appendix H) and Section 4.9 of this Draft EIS. The Confederated Bands of the Warm Springs Reservation of Oregon provided comments, which Ecology considered and accepted, as appropriate. A meeting was held with Ecology and Yakama Nation technical staff to gain their input following the review opportunity.

7.3 Agency Coordination

Ecology worked with state agencies that have expertise in areas evaluated in the Draft EIS. These agencies included the Washington State Department of Archaeology and Historic Preservation, WDFW, WDNR, and WSDOT. Ecology met with the Washington State Department of Archaeology and Historic Preservation and WDFW staff on several occasions to discuss project impacts and potential for mitigation. State agency staff reviewed draft technical reports and Draft EIS text prior to development of this Draft EIS.

8 List of Preparers and Contributors

NAME	SUBJECT MATTER
Agencies	
Washington Department of Ecology	Soils and Geology, Water Resources, Air Quality and GHGs, Energy Resources, Public Services and Utilities, Aquatic Species and Habitats, Terrestrial Species and Habitats, Aesthetics/Visual Quality, Cultural and Tribal Resources, Environmental Health, Land Use, Recreation, Transportation, Environmental Justice, Climate Change, Cumulative Impacts
Washington Department of Fish and Wildlife	Aquatic Species and Habitats, Terrestrial Species and Habitats, Climate Change, Cumulative Impacts
Washington State Department of Archaeology and Historic Preservation	Cultural and Tribal Resources
Washington State Department of Natural Resources	Soils and Geology, Aquatic Species and Habitats, Land Use
Washington State Department of Transportation	Transportation
Consultant Team	
Anchor QEA, LLC	Soils and Geology, Water Resources (Wetlands and Regulated Waters), Public Services and Utilities, Aquatic Species and Habitats, Terrestrial Species and Habitats, Aesthetics/Visual Quality, Cultural and Tribal Resources, Environmental Health (Noise), Land Use, Recreation, Transportation, Environmental Justice, Climate Change, Cumulative Impacts
Aspect Consulting, LLC	Environmental Health, Water Resources (Surface and Groundwater Hydrology)
Trinity Consultants, Inc.	Air Quality and Greenhouse Gases, Energy Resources, Climate Change
White Bluffs Consulting	Tribal Resources

9 Distribution List

Applicant and Landowners

- Free Flow Power 101, LLC.
- Rye Development
- NSC Smelter, LLC

Washington State Agencies and State-Elected Officials

- Washington Department of Fish and Wildlife
- Washington State Conservation Commission
- Washington Emergency Management Division
- Washington State Department of Agriculture
- Washington State Department of Archaeology and Historic Preservation
- Washington State Department of Commerce
- Washington Department of Ecology SEPA Register
- Washington State Department of Natural Resources
- Washington State Department of Transportation
- Washington State Legislature, Representatives and Senators from Districts 8, 13, 14, 15, 18, 24, 32, 34, 36, and 42
- Washington State Parks
- Washington State Recreation and Conservation Office
- Washington State U.S. Representatives
- Washington State U.S. Senators

Local Governments, Agencies, and Locally Elected Officials

- Klickitat County
- City of Goldendale
- Public Utility District No. 1 of Klickitat County

Tribes and Tribal Representation

- Confederated Tribes of the Umatilla Indian Reservation
- Nez Perce Tribe
- Confederated Bands of the Warm Springs Reservation of Oregon
- Confederated Tribes and Bands of the Yakama Nation
- Chinook Indian Nation
- Coeur d'Alene Tribe
- Confederated Tribes of the Chehalis Reservation
- Confederated Tribes of the Colville Reservation
- Confederated Tribes of Grand Ronde
- Cowlitz Indian Tribe
- Duwamish Tribe
- Hoh Indian Tribe
- Jamestown S'Klallam Tribe
- Kalispel Tribe of Indians
- Kikiallus Indian Nation
- Kootenai Tribe of Idaho
- Lower Elwah Klallam Tribe
- Lummi Nation
- Makah Tribe
- Muckleshoot Indian Tribe
- Nisqually Indian Tribe
- Nooksack Indian Tribe
- Port Gamble S'Klallam Tribe
- Puyallup Tribe

- Quileute Tribe
- Quinault Indian Nation
- Samish Indian Nation
- Sauk-Suiattle Indian Tribe
- Shoalwater Bay Indian Tribe
- Skokomish Indian Tribe
- Snohomish Tribe
- Snoqualmie Indian Tribe
- Snoqualmoo Tribe
- Spokane Tribe of Indians
- Squaxin Island Tribe
- Steilacoom Tribe
- Stillaguamish Tribe of Indians
- Suquamish Tribe
- Swinomish Indian Tribal Community
- Tulalip Tribes
- Upper Skagit Indian Tribe
- Wanapum Tribe
- Columbia River Intertribal Fish Commission
- Northwest Indian Fisheries Commission

Federal and Regional Agencies

- Federal Energy Regulatory Commission
- U.S. Army Corps of Engineers
- U.S. Fish and Wildlife Service
- National Oceanic and Atmospheric Administration
- U.S. Environmental Protection Agency
- National Forest Service
- Bonneville Power Administration

Other Agencies and Organizations

- Rogue Climate
- Western Environmental Law Center
- Columbia Riverkeeper
- Trout Unlimited
- Columbia Gorge River Commission
- Puget Soundkeeper Alliance
- Columbia Gorge Audubon Society
- Earthjustice
- Friends of the Columbia Gorge
- Hydropower Reform coalition
- Lower Columbia Stewardship Community
- Northwest Environmental Defense Center
- Sierra Club
- Environment Washington
- American Rivers
- Oregon Wild
- Public Power Council
- Friends of the White Salmon River
- The Nature Conservancy
- Friends of the San Juan
- Washington State Building and Construction Trades Council
- Longview-Kelso Building and Construction Trades Council
- Certified Electrical Workers of Washington
- Columbia Pacific Building and Construction Trades Council
- Goldendale Chamber of Commerce
- Mid-Columbia Economic Development District
- Washington Environmental Council

Libraries

- Goldendale Community Library

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Appendix A
Scoping Summary Report

Appendix B
Surface and Groundwater Hydrology Resource Analysis Report

Appendix C
Wetlands and Regulated Waters Resource Analysis Report

Appendix D
Air Quality and Greenhouse Gases Resource Analysis Report

Appendix E
Energy Resource Analysis Report

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Appendix H
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Appendix I
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Appendix J
Environmental Justice Report