Appendix I
Environmental Health Resource Analysis Report

June 2022

Proposed Goldendale Energy Storage Project

Environmental Health Resource Analysis Report

Prepared for

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Acronyms and Abbreviations

AFY	acre-feet per year
AO	Agreed Order
AOC	area of concern
Applicant	Free Flow Power Project 101, LLC
BAU	Basalt Aquifer Upper Zone
CAP	cleanup action plan
CGA	Columbia Gorge Aluminum
CSWGP	Construction Stormwater General Permit
dB	decibel
EAP	Emergency Action Plan
Ecology	Washington Department of Ecology
EDNA	Environmental Designations for Noise Abatement
EIS	Environmental Impact Statement
FERC	Federal Energy Regulatory Commission
FS	feasibility study
MTCA	Model Toxics Control Act
NAVD88	North American Vertical Datum of 1988
NPDES	National Pollutant Discharge Elimination System
PAH	polycyclic aromatic hydrocarbon
PLP	potentially liable party
PPA	prospective purchaser agreement
PPCD	prospective purchaser consent decree
PPV	peak particle velocity
RCRA	Resource Conservation and Recovery Act
RCW	Revised Code of Washington
RI	remedial investigation
SEPA	State Environmental Policy Act
SPL	spent pot liner
SWMU	solid waste management unit
SWPPP	Stormwater Pollution Prevention Plan
UA	unconsolidated aquifer

USC	United States Code
WAC	Washington Administrative Code
WMP	Wildlife Management Plan
WRIA	Water Resource Inventory Area
WSI	West Surface Impoundment

Summary

This report describes existing conditions and probable impacts to environmental health resources within the study area resulting from the proposed project and the No Action Alternative. The study area for the environmental health analysis encompasses the proposed project area, part of which is located within an active environmental cleanup site, as well as downgradient groundwaters and downstream surface waters (Figure 1).

The following environmental health-related issues were analyzed for both construction and operation of the proposed project:

- Impacts on the human health or the environment resulting from release of contaminants
- Impacts on physical safety
- Impacts on humans from noise and vibration
- Impacts from damage, breach, or other failure of the constructed reservoirs

Table 1 summarizes anticipated impacts to environmental health assuming the requisite permitting and Federal Energy Regulatory Commission (FERC) licensing and approvals processes are completed for the proposed project.

Table 1
Environmental Health Impact Summary

TYPE OF IMPACT	SIGNIFICANT ADVERSE IMPACT FINDING	MITIGATION REQUIRED BY PERMIT	ADDITIONAL MITIGATION PROPOSED	SIGNIFICANT AND UNAVOIDABLE ADVERSE IMPACT
Proposed Project: Construction				
Release of contaminants to the environment	No	Prepare Stormwater Pollution Prevention Plan (SWPPP) and monitor and manage stormwater quality as per Administrative Order on Construction Stormwater General Permit Implement water quality provisions under Section 401 water quality certification	Construction Water Resource Monitoring and Response Plan	No
Physical safety risks	No	None	Best management practices	No
Noise and vibration	No	None	Noise control measures	No
Reservoir damage, breach, or failure	No	FERC requirements for design and construction inspection and monitoring	None	No

TYPE OF IMPACT	SIGNIFICANT ADVERSE IMPACT FINDING	MITIGATION REQUIRED BY PERMIT	ADDITIONAL MITIGATION PROPOSED	SIGNIFICANT AND UNAVOIDABLE ADVERSE IMPACT
Proposed Project: Operations				
Release of contaminants to the environment	No	Prepare SWPPP and monitor and manage stormwater quality as per Industrial Stormwater General Permit Implement water quality provisions under Section 401 water quality certification	Operations Water Resource Monitoring and Response Plan	No
Physical safety risks	No	None	None	No
Noise and vibration	No	None	None	No
Reservoir damage, breach, or failure	No	FERC requirements for post-construction inspection and monitoring	None	No
No Action Alternative				
Release of contaminants to the environment	No	None	None	No
Physical safety risks	No	None	None	No
Noise and vibration	No	None	None	No
Reservoir damage, breach, or failure	Not Applicable	Not Applicable	Not Applicable	Not Applicable

1 Introduction

Free Flow Power Project 101, LLC (the Applicant) proposes to build a pumped-water energy storage system that is capable of generating energy through release of water from an upper reservoir down to a lower reservoir. This is referred to as the “proposed project.” This report describes environmental health resources within the study area and assesses probable impacts on those resources from construction and operation of the proposed project and a No Action Alternative. Chapter 2 of the State Environmental Policy Act (SEPA) Environmental Impact Statement (EIS) provides a more detailed description of the proposed project and No Action Alternative.

1.1 Resource Description

This report describes environmental health considerations including those associated with soil, water, environmental hazards, noise, vibration, and physical safety. In this report, the term “soil” refers to naturally occurring geological materials and solid waste materials historically disposed within the former Columbia Gorge Aluminum (CGA) smelter site in accordance with the definition of “soil” under the state Model Toxics Control Act (MTCA) Washington Administrative Code (WAC) 173.340.200. The term “water” refers to groundwater and surface water including the Columbia River and its tributaries.

Soil is a mixture of organic and inorganic solids, air, water, and biota that exists on the earth's surface above bedrock, including materials of anthropogenic sources such as slag, sludge, etc. (WAC 173.340.200).

Groundwater is water in a saturated zone beneath the ground surface.

Surface water is any body of water above ground, including streams, rivers, lakes, wetlands, reservoirs, and creeks.

The following key features of environmental health are analyzed in this report:

- Completion of the portion of the environmental cleanup for the former CGA smelter site to be included in the Applicant’s Prospective Purchaser Agreement
- Any releases to the environment of toxic, hazardous, or other materials with the potential to affect public health or the ecological environment
- Impacts on physical safety
- Impacts from damage, breach, or other failure of the constructed reservoirs
- Other potential impacts to the health and safety of people and the environment, as relevant
- Noise and vibration, as relevant

The *Surface and Groundwater Hydrology Resource Analysis Report* (Appendix B of the EIS; Aspect Consulting 2022) provides additional details regarding groundwater, surface water, and water quality (excluding toxics and hazardous materials). Section 4.1 of the EIS provides additional information on geology and soils. 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 report.

1.2 Regulatory Context

Table 2 identifies the primary federal, state, and local regulations, statutes, and guidelines that contributed to the evaluation of potential impacts to environmental health within the study area.

Table 2

Applicable Laws, Plans, and Policies for Environmental Health

REGULATION, STATUTE, GUIDELINE	DESCRIPTION
Federal	
Resource Conservation and Recovery Act (United States Code [USC] 42.6901)	• Creates the framework for the proper management of hazardous and non-hazardous solid waste.
Noise Control Act of 1972 (USC 42.4910)	• Protects the health and welfare of United States citizens from the growing risk of noise pollution, primarily from transportation vehicles, machinery, and other commerce products. • Increases coordination between federal researchers and noise control activities; establishes noise emission standards; and presents noise emission and reduction information to the public.
Federal Energy Regulatory Commission, Department of Energy (Code of Federal Regulations 18.I)	• Provides requirements and guidance concerning applications for licenses and the supervision of existing licenses for hydropower projects. • Establishes engineering guidelines for design, construction, and operation, monitoring, and maintenance of hydropower projects.
National Dam Safety Program (USC 33.467f)	• Establishes engineering policies and procedures for use in dam site investigation, design, construction, operation, maintenance, and emergency preparedness.
Federal Guidelines for Dam Safety Risk Management (FEMA P-1025)	• Provides guidance for dam safety and operation.
Hazardous Waste Operations and Emergency Response (Code of Federal Regulations 29.1910.120)	• Establishes requirements for training and medical surveillance, health and safety plan preparation, and recordkeeping for workers conducting hazardous material cleanup.
Clean Air Act (USC 42.7401)	• Requires the U.S. Environmental Protection Agency to set health-based standards for ambient air quality, and sets deadlines for state and local governments to achieve those standards.
State	
Washington Clean Air Act (Revised Code of Washington [RCW] 70.94)	• Establishes public policy to preserve, protect, and enhance air quality to comply with the requirements of the Federal Clean Air Act.
Solid Waste Management Act (RCW 70.95)	• Establishes a comprehensive statewide program for solid waste handling, and solid waste recovery and/or recycling that will prevent land, air, and water pollution and conserve the natural, economic, and energy resources of this state.
Hazardous Waste Management Act (RCW 70.105)	• Establishes a statewide framework for the planning, regulation, control, and management of hazardous waste that will prevent land, air, and water pollution and conserve the natural, economic, and energy resources of the state.
Model Toxics Control Act (MTCA; RCW 70.105D)	• Establishes the MTCA and implemented regulations in Chapters 173.204 and 173.340 of the WAC.
Washington State Noise Control Act (RCW 70.107)	• Establishes anti-noise measures to protect the health, safety and welfare of people, value of property, and the quality of the environment.
Water Pollution Control Act (RCW 90.48)	• Establishes it is unlawful to discharge pollutants into waters of the state.
RCW 90.58, Shoreline Management Act	• Requires all counties and most cities with shorelines to develop and implement Shoreline Master Programs.

REGULATION, STATUTE, GUIDELINE	DESCRIPTION
Maximum Environmental Noise Levels (WAC 173.60)	• Establishes maximum environmental noise levels.
Dangerous Waste Regulations (WAC 173.303)	• Requires designation of dangerous and extremely hazardous waste, and proper handling, storage, transport, and disposal of such wastes.
MTCA (WAC 173.340)	• Establishes regulations, processes, and standards to identify, investigate, and clean up facilities where hazardous substances are located. • Defines the roles of Ecology and the public in decision making at regulated facilities.
Solid Waste Handling Standards (WAC 173.350)	• Establishes regulations to protect public health, to prevent land, air, and water pollution, and conserve the state's natural, economic, and energy resources.
Hazardous Waste Operations (WAC 296.843)	• Establishes requirements for training and medical surveillance, health and safety plan preparation, and recordkeeping for workers conducting hazardous material cleanup.
Local	
Klickitat County Municipal Code Title 9	• Regulates the creation of noise that represents a public disturbance.
Klickitat County Municipal Code Title 19	• Establishes use and construction standards, including noise, in the Energy Overlay Zone.
Klickitat County Multi-Hazard Mitigation Plan	• Promotes awareness of natural hazards and proposes solutions to make the County's residents, economy, resources, and ecosystems less vulnerable to the negative effects of natural and man-made hazards.

2 Methodology

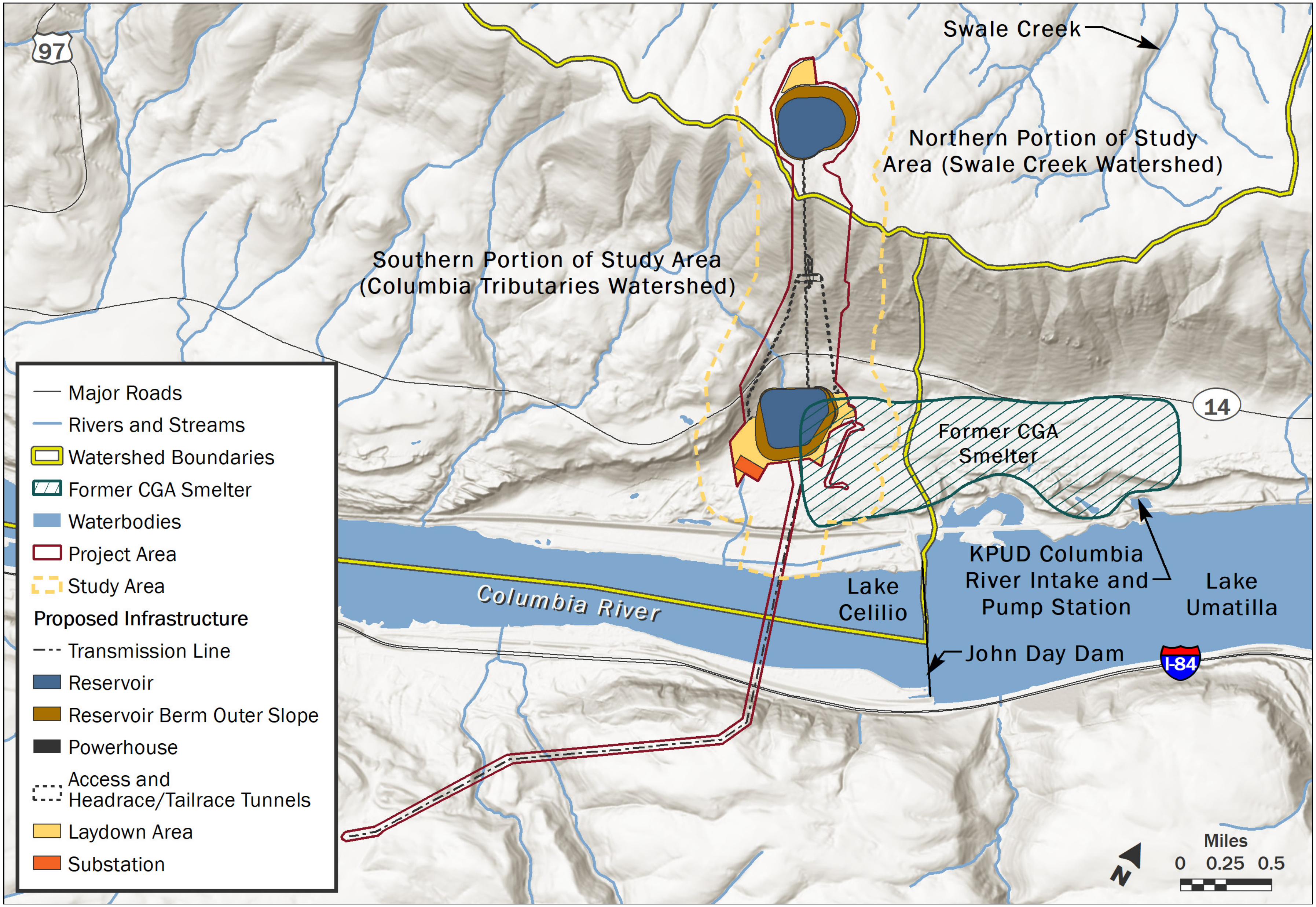
2.1 Study Area

The study area for environmental health encompasses the area associated with the project's excavation and construction areas for the upper and lower reservoirs, water conveyance and power-generating infrastructure located underground within the bedrock bluff between the reservoirs, and additional support structures. It also includes temporary construction staging, access, and equipment and material staging areas. The study area encompasses groundwaters downgradient, ponds or streams downstream, and the Columbia River adjacent to and downstream of the project footprint (Figure 1).

The proposed location for the lower reservoir and adjacent structures overlaps the western portion of the former CGA smelter that operated from 1971 to 2003 under various owners (Figure 1). The smelter property is contaminated from historical industrial practices and is currently undergoing Washington State's environmental cleanup process in accordance with MTCA. The smelter cleanup site includes multiple previously identified solid waste management units (SWMUs) including the West Surface Impoundment (WSI) within the footprint of the proposed lower reservoir, multiple previously identified areas of concern (AOCs), and the associated existing groundwater monitoring network.

Figure 1 also depicts features of the proposed project. The area encompassing the proposed lower reservoir and the connecting conveyance system, pumphouse, and powerhouse between the two reservoirs occurs within the Columbia Tributaries hydrologic subbasin of Water Resource Inventory Area (WRIA) 30, which discharges to the Columbia River (WPN and Aspect Consulting 2005). The proposed location for the upper reservoir lies within the headwaters of the Swale Creek subbasin (tributary) of the Klickitat River watershed, also referred to as WRIA 30 (WPN and Aspect Consulting 2005). The upper reservoir and underground infrastructure are located outside of the smelter cleanup site.

Figure 1
Environmental Health Study Area



Source: FFP 2021a, 2021b

2.2 Technical Approach

Information to describe the affected environment for environmental health was obtained from documentation provided by the Applicant or generated by the CGA smelter cleanup process. The analysis for environmental health included no additional data collection or modeling.

Analysis of the potential effects of the proposed project on hazardous substances within the smelter cleanup site was based on current documented understanding of the nature and extent of contamination within the smelter cleanup site. This included superimposing the proposed project footprint onto maps showing existing areas of contaminated materials within the smelter cleanup site. Identified and probable access corridors for construction, planned means/methods for managing materials removed during construction of the proposed project, and other possible land disturbing activities were considered as part of the review. Information regarding geology and hydrology as relevant to the analysis of environmental health was obtained both from existing documentation for the smelter cleanup site and other resource analysis reports prepared for the EIS.

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 relative to existing noise and vibration and changes that may be perceived by any nearby sensitive receptors. Quantitative assessment was performed using the Federal Highway Administration online noise model (FHWA 2006). Levels of noise and vibration as predicted by the Applicant were also compared to federal, state, and Klickitat County criteria.

2.3 Impact Assessment

The analysis of potential impacts considered construction- and operation-related effects on environmental health including both humans and ecological receptors (e.g., fish and wildlife). The proposed project and No Action Alternative were analyzed to determine the level of impact on environmental health in the study area. In general, impacts for environmental health are identified based on their potential to conflict with regulatory requirements (e.g., violate promulgated standards) or otherwise change baseline conditions.

Using the existing information, the technical analysis assessed potential effects on study area environmental health from the following:

- Constructing the proposed project, considering construction of the reservoirs (e.g., excavation and export of materials, some of which would be contaminated, excavation dewatering, subgrade preparation, materials import and grading, and concrete placement), underground tunnels and cavern (rock tunneling/blasting including management of any water produced, materials export), and above-grade structures adjacent to the lower reservoir (e.g., grading, subgrade preparation, and structure fabrication)
- Operating the proposed project, with a focus on the potential effects to existing contamination remaining in place elsewhere on the smelter cleanup site, effects to public health resulting from noise/vibration, and potential impacts resulting from damage to the reservoirs

The evaluation of potential effects of the proposed project on study area environmental health resources considered the following potential changes:

- **Reservoir damage, breach, or failure:** threats to human health and safety or the ecological environment
- **Release of contaminants to the environment:** harm to human or ecological receptors 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 human or ecological receptors

3 Technical Analysis and Results

3.1 Overview

This section describes the affected environment, or the conditions before any construction begins (Section 3.2), as well as findings of probable impacts on environmental health from the proposed project (Section 3.3) and No Action Alternative (Section 3.4). For the proposed project, required permit conditions and planning document requirements that could address the impacts are identified (Section 3.3.3). This report also identifies mitigation measures that could avoid, minimize, or reduce the potential impacts (Section 3.3.4) and determines if there would be significant and unavoidable adverse environmental impacts remaining after mitigation (Section 3.3.5).

3.2 Affected Environment

The affected environment for environmental health encompasses the proposed project footprint plus surrounding areas that could be directly or indirectly affected by construction or operation of the proposed project and the No Action Alternative. There are no persons residing within or adjacent to the proposed project footprint. Scattered farm residences exist within the Swale Creek subbasin west and north of the northern extent of the proposed project. The closest reported residence is a single residence 0.4 mile away from the lower reservoir area (FFP 2020a, 2022). The closest town is Goldendale, Washington, located approximately 8 miles northwest with a population of approximately 3,500 residents.

Given the layout of the proposed project, the affected environment within the environmental health study area can be divided into northern and southern portions separated at the top of the bedrock bluff as follows (Figure 1):

- In the northern area, the proposed upper reservoir and upper temporary staging area and downstream/downgradient areas are located in the Swale Creek subbasin as defined in the WRIA 30 watershed planning process (WPN and Aspect Consulting 2005). Swale Creek flows westward to the Klickitat River, which then flows south and discharges to the Columbia River roughly 35 miles downstream of the project footprint.
- In the southern area, the proposed lower reservoir, associated underground power production infrastructure, and about 4 miles of the transmission right-of-way spanning the Columbia River and into northern Oregon, as well as respective downstream/downgradient areas, lie within the Columbia River tributaries subbasin, as defined in the WRIA 30 watershed planning process, which drains directly to the Columbia River.

Construction and operation of the aerial electrical transmission line portion of the proposed project located within Oregon would use existing infrastructure and is not anticipated to involve earthwork or activities that would impact environmental health. The Oregon portion of the proposed project is therefore not considered further in this report.

The following sections describe the existing topography and climate, hydrology and hydrogeology, cleanup considerations, and noise and vibration conditions in the affected environment, as pertinent to the key features of environmental health outlined in Section 1.1.

3.2.1 Topography and Climate

Sections 4.1 and 4.2 of the EIS provide information related to topography, portions of which are summarized in this resource report. The proposed lower reservoir area is on a topographic bench ranging in elevation from approximately 400 to 800 feet relative to North American Vertical Datum of 1988 (NAVD88) about 1,500 feet north of the Columbia River (see Figure 1). South of the proposed project footprint, 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.

Between the two proposed reservoirs, the Columbia Hills form a steep topographic bluff that rises from around 900 feet NAVD88 along the north side of SR 14 to approximately 3,000 feet at the top of the bluff. The proposed upper reservoir area occurs on the plateau at the top of the bluff. Elevations in that area range from approximately 2,700 to 3,000 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 (roughly 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 1).

The proposed project area is characterized by hot and dry conditions in the summer (80°F to 90°F average daytime high temperature in the summer months) and relatively cold conditions in the winter (30°F to 40°F average daytime high in the winter months), with some moderation in temperatures due to proximity to the Columbia River (WRCC 2021). For purposes of preliminary design, using available data from the Western Regional Climate Center's John Day and Goldendale climate stations, HDR (2020) estimated an annual average precipitation of approximately 10 inches for the lower reservoir area (southern study area) and 17 inches for the upper reservoir area (northern study area). Most of the precipitation in the area occurs November through February, with the wettest months being December and January (Tetra Tech et al. 2015a).

3.2.2 Hydrology and Hydrogeology

The following sections briefly summarize the hydrologic and hydrogeologic conditions within the study area, which are pertinent to analysis of potential releases to the environment of toxic, hazardous, or other materials associated with the CGA smelter cleanup site or the proposed project infrastructure. Additional details regarding hydrology and hydrogeology within the study area are provided in the *Surface and Groundwater Hydrology Resource Analysis Report* (Appendix B of the EIS).

3.2.2.1 Surface Water Hydrology

The Columbia River is the ultimate receiving waterbody for discharges of all surface waters in the project vicinity. John Day Dam is located on the Columbia River immediately upstream of the proposed project footprint, creating John Day Pool (Lake Umatilla) upstream of it. The proposed project footprint is adjacent to and traverses The Dalles Pool (Lake Celilo), which is impounded by The Dalles Dam approximately 24 river miles downstream of John Day Dam.

In the area of the proposed lower reservoir, ephemeral and/or intermittent drainages drain to the Columbia River. During a May 2019 field delineation of wetlands and watercourses, the Applicant's consultant, ERM, documented an intermittent stream (labeled Stream S17). This stream enters a metal culvert beneath SR 14 but does not exit the culvert south of the highway, suggesting that the flow infiltrates into the subsurface beneath the highway. The field delineation did not

> An **intermittent** stream flows during some but not all times of the year.
>
> A **perennial** stream flows year-round.
>
> An **ephemeral** stream contains water only following precipitation.

document other watercourses within the proposed project footprint of the lower reservoir area (FFP 2020b).

The upper reservoir, upper temporary staging area, and downstream/downgradient areas are located in the uppermost headwaters of the Swale Creek subbasin. Small drainages that are headwater tributaries to Swale Creek occur within and extend north of the proposed upper reservoir area. Two small streams within the footprint of the upper reservoir, labeled Streams S7 and S8, were documented by the Applicant's consultant as intermittent or ephemeral, depending on specific location (ERM 2021a). The main channel of Swale Creek is roughly 2 miles north of the proposed project footprint. Swale Creek flows westward for 13 to 14 miles through a broad alluvial valley (termed Swale Valley) before transitioning into a steeply incised bedrock canyon termed Swale Canyon. Swale Creek flows another 13 miles northwestward through Swale Canyon before discharging to the Klickitat River, which then flows south and discharges to the Columbia River roughly 35 miles downstream of the proposed project footprint.

3.2.2.2 Hydrogeology and Groundwater Flow

Within the area of the proposed lower reservoir, unconsolidated deposits form the shallowest unconfined water-bearing zone, generally referred to as the unconsolidated aquifer (UA). In the area of the smelter cleanup site's West Surface Impoundment (WSI), discussed in Section 3.2.3, which is within the footprint of the proposed lower reservoir, the UA's water table slopes steeply to the southwest, from elevations of approximately 460 to 390 feet NAVD88, with resulting groundwater flow direction to the southwest, as depicted in Figure 2. Figure 2 is reproduced from GeoPro (2020), and the yellow area depicted on it is the WSI.

Although groundwater in the UA flows southwestward toward the Columbia River, it does not discharge directly to the river. Rather, some UA groundwater daylights into wetlands identified south of the project footprint, with the majority discharging downward through fractures into the underlying basalt water-bearing zones (Tetra Tech et al. 2015a).

> **Unconsolidated material** is sediment with loosely arranged particles that are not compacted and cemented sufficiently to create rock.
>
> An **aquifer** is an underground geological formation filled with water and capable of supplying useful quantities of water to a well or spring. Within the study area, aquifers occur both in unconsolidated materials and bedrock.
>
> The **unconsolidated aquifer (UA)** is the shallowest water-bearing sands and gravels occurring in the area of the proposed lower reservoir.

Figure 2
Water Table Elevation Contour Map for Lower Reservoir (WSI) Area

Source: GeoPro 2020

Beneath the UA, the Grande Ronde basalt extends thousands of feet below ground surface and is composed of layered individual basalt flows ranging in thickness between 50 and 80 feet. The entire thickness of basalt does not contain groundwater. Rather, the basalts' aquifer zones occur in relatively thin, porous zones that exist at the vertical contact between the individual basalt flows (termed "interflow zones"). Typically, the interflow aquifer zones are vertically separated by tens of feet of non-porous basalt that does not contain groundwater. In the area of the proposed lower reservoir, the smelter cleanup site documentation identifies the shallowest basalt aquifer zone, referred to as the Basalt Aquifer Upper Zone (BAU), at a depth ranging from roughly 30 to 40 feet below ground surface. As it occurs in the UA, the groundwater flow direction in the BAU is primarily southwest toward the Columbia River. A series of confined aquifer zones occur in deeper basalt interflow zones beneath the BAU (Tetra Tech et al. 2015a).

Basalt **interflow zones** are water-bearing zones consisting of the combined top of one basalt flow, the bottom of the overlying flow, and any intervening sediment.

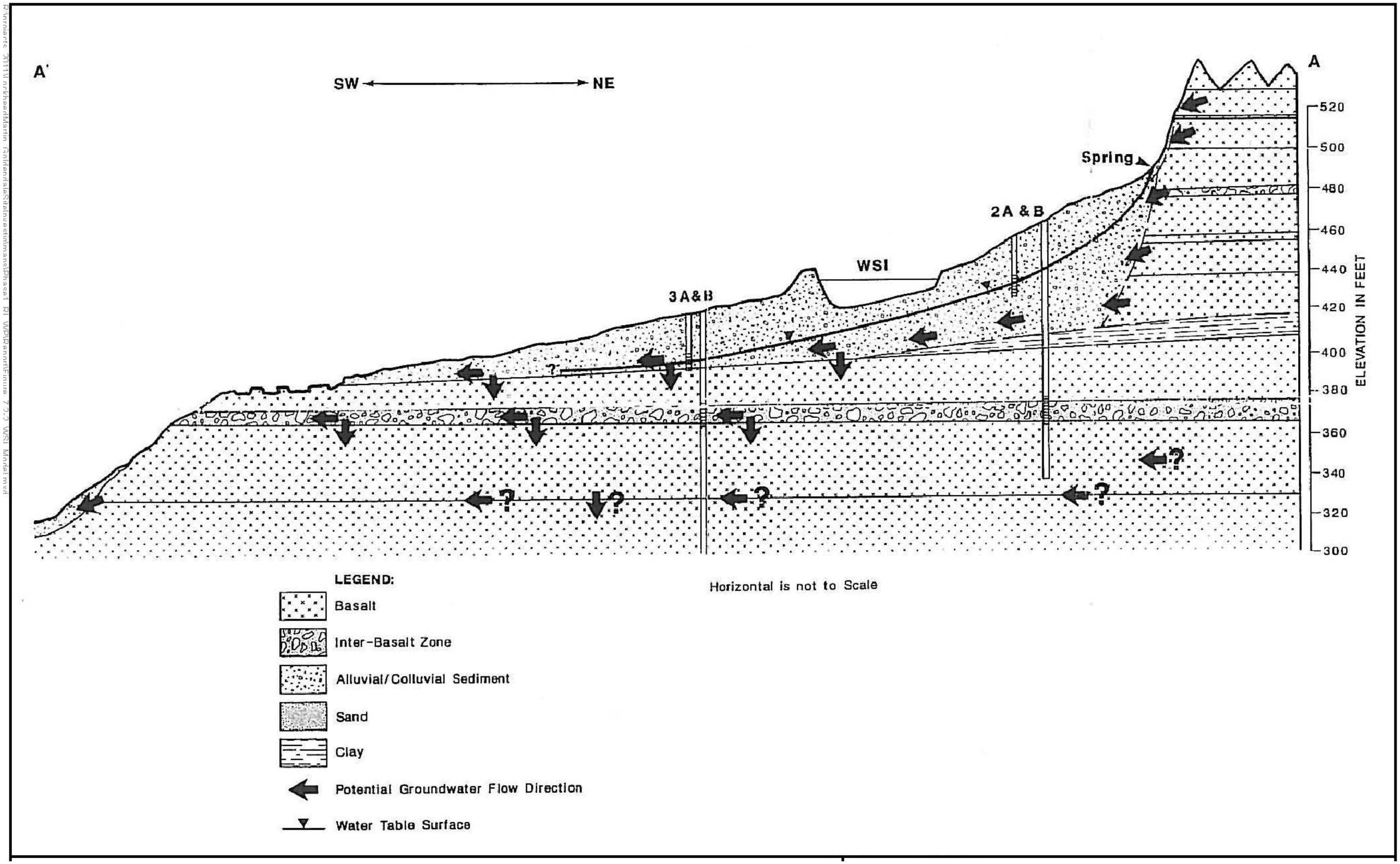
A vertical downward gradient occurs from the UA to the underlying BAU. Vertical gradients are also documented within the deeper basalt water-bearing zones down to the surface water elevation of the Columbia River. Near this elevation, the gradient becomes less steep as groundwater levels are largely controlled by the lake elevation. The basalt aquifer system flows toward the southwest and, depending on elevation of the interflow aquifer zone, discharges as springs along the bank of Lake Celilo above the lake elevation (151 to 156 feet NAVD88) or directly to Lake Celilo below the waterline. During an investigation for the smelter cleanup site, no springs were observed draining the basalt cliff faces near the Columbia River south of the project site (Tetra Tech et al. 2015a), suggesting the groundwater discharge occurs beneath the lake surface. Figure 3 is a cross-sectional conceptual hydrogeological model, reproduced from Tetra Tech et al. (2015a), depicting the UA at the surface ("alluvial/colluvial sediment") and the underlying basalt with water-bearing interflow ("inter-basalt") zones extending from the base of the Columbia Hills bluff on the right side of the figure (northeast) to the bank of the Columbia River on the left side (southwest). The figure conceptually illustrates directions of groundwater flow laterally within and vertically between the UA and underlying basalt zones. The figure also shows the WSI that is located partially within the footprint of the proposed lower reservoir.

Within the area of the proposed upper reservoir, the primary geologic units within the Swale Creek subbasin include, from the surface down, unconsolidated alluvium and sedimentary rocks (collectively termed the alluvium aquifer) that are limited to Swale Valley, Wanapum basalt, and Grande Ronde basalt. Groundwater in the alluvial aquifer is unconfined and generally flows from east to west. Groundwater within the deeper basalt aquifers beneath the Swale Valley also flows generally east to west. However, due to a regional geologic fault (Warwick Fault) located approximately 17 miles west of the proposed project that impedes groundwater flow, much of the basalt aquifer groundwater beneath Swale Valley flows to the northwest into the Little Klickitat subbasin with discharge to the Little Klickitat River (Aspect 2010).

Alluvium is unconsolidated sand, gravel, and silt deposited by steams or rivers.

Sedimentary rocks are formed from compaction and cementation of pre-existing rocks or pieces of once-living organisms.

Figure 3
Conceptual Hydrogeologic Model for Lower Reservoir (WSI) Area



Source: Tetra Tech et al. 2015a.
Note: Question marks indicate uncertainty in deeper groundwater flow directions.

The 2,400-foot bedrock bluff comprising the Columbia Hills between the lower and upper reservoir areas is composed of predominantly Grande Ronde basalt. A groundwater divide separating the southern portion of the study area (lower reservoir area) flows generally southwestward as described above, and groundwater in the basalt aquifers of the northern portion of the study area (upper reservoir area) flows generally westward. A groundwater divide separating the northern and southern portions of the study area 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 as a result of a potentially complex geometry of the geologic structures comprising the Columbia Hills in the project area. Given the lack of groundwater flow information along the top of the bluff, it is assumed that, for purposes of this analysis, the proposed project's underground infrastructure would straddle an existing groundwater divide within the basalts. Groundwater to the north of the divide discharges toward the Swale Creek basin, and groundwater to the south of the divide discharges toward the Columbia River. Given the south-facing exposed 2,400-foot-tall basalt face and the documented groundwater seepage along it, it is inferred that a greater portion of the groundwater within the area of the proposed underground infrastructure flows south toward the Columbia River.

3.2.3 CGA Smelter Site Cleanup

The former CGA smelter site encompasses an approximately 350-acre area within and east of the proposed lower reservoir (Figure 1). The site operated as an aluminum smelter from 1971 until operations ceased in 2003 due to the cost of the electrical power. Demolition of all buildings directly associated with the smelter operations began in 2011 and was completed in spring 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. Tetra Tech et al. (2015a) provides additional details regarding operational history of the smelter.

In 2014, the Washington Department of Ecology (Ecology) and the potentially liable parties (PLPs) for the CGA smelter cleanup site—NSC Smelter LLC (property owner) and Lockheed Martin Corporation (former property owner and operator)—executed Agreed Order No. 10483 (AO) for cleanup of contamination within the CGA smelter site in accordance with the state's MTCA cleanup regulation (WAC 173.340). The AO requires the PLPs to conduct the following tasks:

- Develop a Remedial Investigation (RI) Work Plan
- Conduct an RI to define the nature and extent of contamination at the site
- Develop a feasibility study (FS) evaluating alternative cleanup approaches and identifying a preferred alternative for the site
- Develop a draft cleanup action plan (CAP) that describes the selected cleanup action for the site

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.

The AO requires that the draft RI, draft FS, and draft CAP be prepared for public comment in a process administered by Ecology, after which public comments would be incorporated to prepare a final version of each document. Ecology would ultimately select the final cleanup action, which would be documented in a final CAP and then would be implemented by the PLPs in accordance with a subsequent legal agreement between Ecology and the PLPs.

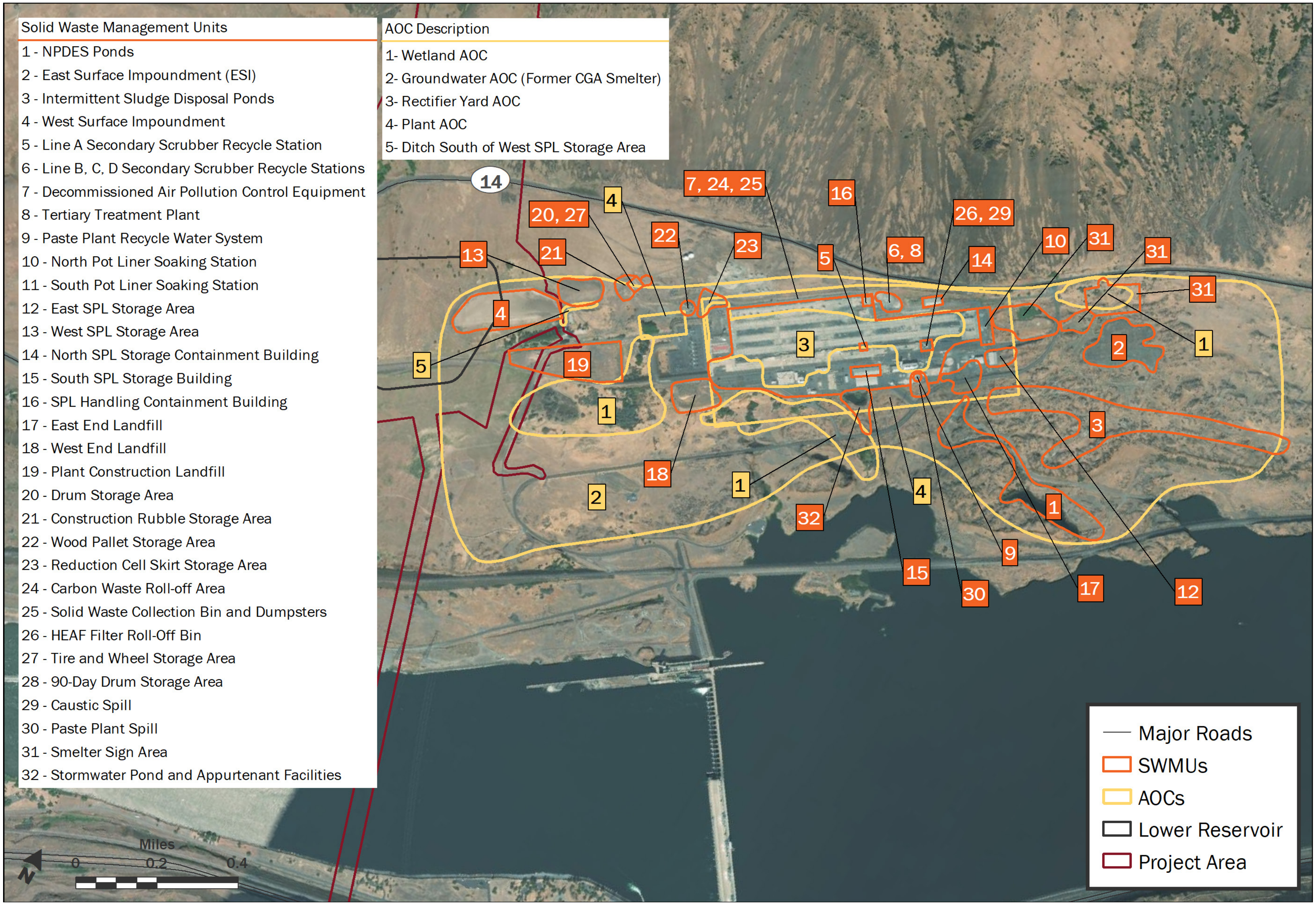
The AO defined 32 SWMUs and four areas of concern (AOCs) within the cleanup site, and a fifth AOC was identified during completion of the RI Work Plan (Tetra Tech et al. 2021). Figure 4 shows locations of the identified SWMUs and AOCs. One SWMU, the WSI (SWMU 4), is located within the proposed project footprint, overlapping a portion of the proposed lower reservoir footprint. The proposed lower reservoir area is also within AOC 2 Groundwater in the Uppermost Aquifer.

The smelter cleanup site occurs solely within the southern portion of the proposed project area, adjacent to the lower reservoir, as shown in Figures 1 and 4. The proposed underground water conveyance and power generation infrastructure and the upper reservoir are not affected by contaminants from the cleanup site.

3.2.3.1 Areas of Contaminated Materials in Proximity to Proposed Project Footprint

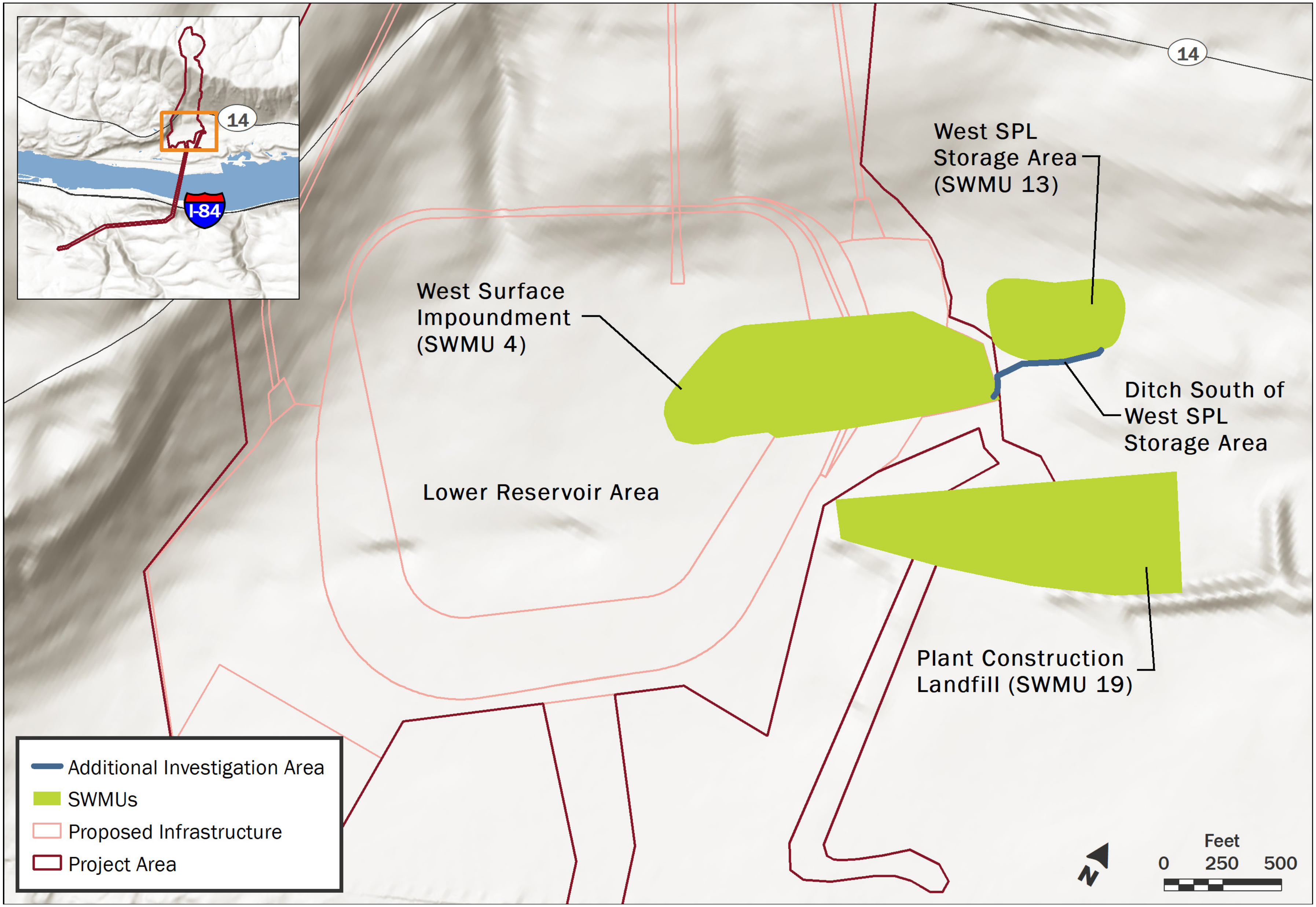
The revised RI (Tetra Tech et al. 2021) provides details regarding the characteristics for each of the SWMUs and AOCs within the cleanup site. For purposes of this analysis, three SWMUs (numbers 4, 13, and 19) are described below because of their proximity to the proposed lower reservoir area, as illustrated in Figure 5. The description of these three SWMUs is derived from information presented in the site AO (Ecology 2014) and RI Work Plan (Tetra Tech et al. 2015a, 2015b). In addition, during completion of the RI Work Plan in 2015, Ecology identified the ditch on the southern side of SWMU 13 as an additional area for investigation (Tetra Tech et al. 2021). This ditch is also discussed in conjunction with SWMU 13.

Figure 4
Locations of SWMUs and AOCs, CGA Smelter Cleanup Site



Source: FFP 2021b
Notes:
AOC: Area of Concern HEAF: High Efficiency Air Filtration SPL: Spent Pot Liner SWMU: Solid Waste Management Unit

Figure 5
SWMUs Within and Adjacent to Proposed Lower Reservoir Area



Source: FFP 2021a, 2021b

SWMU 4: West Surface Impoundment

The WSI is the one SWMU located within the excavation limits for the proposed project's lower reservoir (Figure 5). As part of the smelter operations, an approximately 10-acre limited purpose landfill designated as the WSI was constructed in 1981. The landfill impoundment was formed by excavating into the hillside and using the excavated material to form the downhill retaining wall. The 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 process (i.e., tertiary plant waste solids underflow, sulfur dioxide scrubbers underflow, and thickener and reaction clarifier filter press cake)
- 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

Originally, the air pollution control system solids comprising the majority of the WSI sludge were designated as a state-only dangerous waste under WAC 173.303 until the regulation was revised in 1995. As a result of the revision, the sludge was designated as solid waste (not dangerous waste).

In 2004, the WSI was closed in accordance with federal Resource Conservation and Recovery Act (RCRA) 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 within the UA.

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 secondary maximum contaminant level that is based on aesthetics (e.g., taste, color, or smell of the water) not toxicity to human or ecological receptors. 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

The West Spent Pot Liner (SPL) Storage Area is located immediately northeast of the proposed project's lower reservoir (Figure 5). The West SPL Storage Area operated as a storage area for SPL until closure 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 SPL was not a listed hazardous waste and was handled at the plant as a solid waste. However, SPLs are 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 SPL Storage Area

A ditch running along the south edge of the West SPL Storage Area (Figure 5) 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 in the UA. 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). Based on Ecology review of the 2019 draft RI, this area was further characterized in accordance with the 2020 RI Work Plan Addendum (Tetra Tech et. al. 2020), as reported in the revised RI (Tetra Tech et al. 2021).

The primary contaminants of concern associated with the south ditch are PAHs and fluoride.

SWMU 19: Plant Construction Landfill

The Plant Construction Landfill is located 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 (Figure 5). During construction of the smelter in 1969 to 1970, the construction contractor reportedly disposed of general debris in this area. 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.

3.2.3.2 Status of Remedial Actions at Smelter Cleanup Site

The AO required that the RI Work Plan preparation (Phase 1 and Phase 2) be prepared as two separate volumes. The Phase 1 Work Plan (Tetra Tech et al. 2015a) summarized available information and data regarding the 32 SWMUs and 5 AOCs identified in the AO, evaluated existing information regarding each SWMU and AOC to determine if they required further investigation, and identified data gaps and data needs for each.

The Phase 2 Work Plan (Tetra Tech et al. 2015b) defined the specific investigation and evaluation activities for each SWMU and AOC that required further investigation to fully characterize the nature and extent of contamination in accordance with MTCA requirements. Following completion of the RI data collection program between 2015 and 2018, a draft RI was submitted to Ecology for review in January 2019. The PLPs subsequently prepared a Work Plan Addendum (Tetra Tech et al. 2020) to address additional data gaps identified in comments provided on the draft RI by Ecology and the Confederated Tribes and Bands of the Yakama Nation in June 2019 (comments and PLP responses to them are included as Appendix A-1 to Tetra Tech et al. 2020). The PLPs submitted a revised draft RI, incorporating additional data collection in accordance with the Work Plan Addendum, in November 2021.

3.2.4 Noise and Vibration

Noise is commonly defined as unwanted sound that disrupts normal human activities or diminishes the quality of the human environment. Short duration noise is created by activity like passing airplanes or motor vehicles. Stationary sources such as a power lines, transformers, or substations can emit noise over a longer period. Ambient sound level is the total of all sound sources excluding human-created sources (WSDOT 2020). Background sound level is a combination of sound from all sources including human-created sources (WSDOT 2020). Ambient sounds include weather (wind and rain), running water, and wildlife sounds (e.g., bird song). Background sound is caused by typical noise sources such as traffic, neighboring businesses, or industries. Background sound level is a typical mix of noise from near and distant sources.

Noise is usually measured in decibels (dB) on the A-weighted scale (dBA), which corresponds to how humans hear sound. Table 3 shows typical noise levels for common sources expressed in dBA. Noise exposure depends on how much time an individual spends near the source. Noise is measured through the use of several measurements, including the following:

- **Equivalent Sound Level (L_{eq})** is the constant noise level that would result in the same total sound energy being produced over a given period. It is useful for representing a varying sound source over time as a single number.
- **Maximum Sound Level (L_{max})** is the highest sound level measured during a single noise event (e.g., a hammer strike or quarry blast).

Table 3
Common Sound and Noise Levels

SOURCE	SOUND LEVEL (DBA)
Pile driver/rock concert	110
Heavy truck at 50 feet (15.2 meters)	90
Noisy restaurant/freeway traffic	70
Normal conversation indoors	60
Light traffic at 100 feet (30.5 meters)	50
Quiet office	40
Whisper, rustling leaves	20

Sources: WSDOT 2020; Purdue 2021

Noise from a single piece of construction equipment (i.e., a point source) dissipates in a spherical manner, dropping by 6 dB every time the distance from the source is doubled. The amount a noise dissipates also depends on surrounding surfaces, topography, vegetation, and atmospheric conditions (WSDOT 2020). For example, dense vegetation can reduce noise levels by as much as 5 dB for every 100 feet of vegetation. Canyon-shaped areas where noise is reflected can shorten the distance at which noise-related disturbance could occur.

- The study area occurs within the Energy Zone Overlay for Klickitat County. Noise in this area must meet environmental designation for noise abatement per state regulations (Klickitat County Title 19.39.9). Ecology has developed the following three Environmental Designations for Noise Abatement (EDNA) or reduction (WAC 173.60.040):
  - EDNA A: This designation generally corresponds to residential/recreational areas and uses. Normally acceptable noise levels in EDNA A areas range up to 55 to 60 dBA.
  - EDNA B: This designation generally corresponds to commercial uses. Normally acceptable noise levels in EDNA B areas range up to 57 to 65 dBA.
  - EDNA C: This designation generally corresponds to industrial and agricultural uses. Normally acceptable noise levels in EDNA C areas range up to 60 to 70 dBA.

Ecology has set noise limits under WAC 173.60.040 that prohibit noise exceeding the maximum permissible noise levels as determined by the EDNA system. However, WAC 173.60.050 establishes the following exemptions:

- Sounds created by blasting are exempt from the provisions of WAC 173.60.040 between the hours of 7:00 a.m. and 10:00 p.m.
- Sounds originating from temporary construction sites as a result of construction activity and sounds originating from forest harvesting and silvicultural activity are exempt from the provisions of WAC 173.60.040, except when such sounds affect EDNA A areas between the hours of 10:00 p.m. and 7:00 a.m.
- Sounds created by motor vehicles, licensed or unlicensed, when operated off public highways are exempt from the provisions of WAC 173.60.040 except when such sounds are received in EDNA A areas.

Noise-sensitive land uses are types of land use where people may be more adversely affected by prolonged increases in noise over ambient levels. Examples of such land use include residential areas, hospitals, schools, recreational areas, and daycare facilities where any prolonged exposure to increased noise would be more noticeable. Some forms of recreational use, such as camping and hunting, rely on quiet conditions.

There are no homes in or immediately adjacent to the proposed project area. Scattered farm residences are west and north of the northern extent of the proposed project. The closest sensitive land use to the proposed facility construction, a residence, is approximately 2,112 feet (0.4 mile) to the west of the lower reservoir, off SR 14. The nearest receptors to the proposed upper reservoir are infrequently used agricultural buildings to the north, approximately 1.2 miles from the upper reservoir (FFP 2020a).

Existing ambient sound sources in the study area include wind and rain, rustling vegetation, running water from rivers and streams, and wildlife such as birds, insects, and amphibians. Existing background sound sources include agricultural activities and wind turbine operations near the proposed upper reservoir area. Existing background sound sources near the proposed lower reservoir area include hydroelectric operations (e.g., power lines and transformers) and traffic on SR 14. The study area experiences intermittent noise and vibration above background level from railway traffic on the BNSF railroad. The study area likely also experiences occasional noise from overhead airplanes.

Rural areas, such as the study area, with a population density of 1 to 300 people per square mile generally experience background sound levels of 35 to 40 dBA (WSDOT 2020). Rural and remote areas, such as national parks, may experience regular noise intrusions from road and airplane traffic ranging from 45 to 72 dBA (WSDOT 2020). Passing locomotives and railcars may create temporary noise up to 90 dB (USDOT 1982). Existing sound and noise conditions in the study area are expected to be within the range for a rural area with periodic louder noise intrusions.

Trains, heavy trucks, blasting, and jackhammers can all cause ground-borne vibrations, as well as noise. Ground-borne vibration is a technical term to define human-made vibratory motions through the ground, as opposed to vibration caused by geological changes such as earthquakes. Vibrations can affect any structure. Older structures are generally more sensitive to vibration due to their age and the materials used in their construction. Ground vibration is measured in terms of peak particle velocity (PPV), which is the maximum velocity experienced by any point in a structure during a vibration event. The strictest PPV vibration threshold of 0.12 inch per second to prevent damage to susceptible buildings is established by the Federal Transit Administration (FTA 2018).

3.3 Proposed Project

The proposed project would operate as an energy storage project. The initial fill of the pumped-water energy storage system (lower reservoir plus conveyance piping) would be completed through a one-time withdrawal of 7,640 acre-feet of water, at a rate of 21 cubic feet per second for approximately 6 months (estimated).

During operation, approximately 7,100 acre-feet of water would be pumped from the lower reservoir through a larger-diameter conveyance system to the upper reservoir using three variable-speed, reversible pump-turbines in the underground powerhouse and operating in pump mode. To generate power, water would be released from the upper reservoir and pass through the same three variable-speed, reversible pump-turbine units operating in turbine mode, with each generating up to 400 megawatts of electricity. In generation mode, the project is designed to be operated for 12 hours at a time to provide full power generation at a maximum of 1,200 megawatts and a minimum of 100 megawatts. Project operations would then pump water from the lower reservoir back to the upper reservoir in about 15 hours. This operating cycle of pumping and generating would be dictated by market demand but is limited to a maximum of 12 hours of generation per day at maximum generating output (1,200 megawatts), without repeating the cycle during the day.

The proposed system's upper reservoir embankment would be 175 feet high and 8,000 feet long with a storage volume capacity of 7,100 acre-feet and a full-pool water surface area of about 61 acres. The top of the upper reservoir embankment would be at elevation 2,950 feet NAVD88. The lower reservoir embankment would be 205 feet high and 6,100 feet long with a storage volume capacity of 7,100 acre-feet and a full-pool water surface area of about 63 acres. The top of the lower reservoir embankment would be at elevation 590 feet NAVD88. The two reservoirs would be connected by an underground water conveyance system with powerhouse and penstocks housing the three variable-speed, reversible pump-turbine units.

Materials excavated to construct the two reservoirs would be reused during construction for embankment fill to the extent practical. The preliminary project design assumes that the earthwork cut and fill volumes for both reservoirs would be balanced (12 million cubic yards of cut volume and 12 million cubic yards of fill volume). However, preliminary estimates indicate that approximately 1 million cubic yards of fill (net) would be needed to complete the proposed project's other excavation, fill, or grading activities. All wastes and liner materials excavated from the WSI would be disposed of off-site at a permitted landfill. Soil excavated from beneath the WSI would only be reused if sampling demonstrated that the materials met the Ecology-defined cleanup standards. As such, the proposed project would include no reuse of contaminated materials.

To conduct the necessary materials processing and production of concrete, project construction would include set up and operation of an aggregate processing plant and concrete batch plant near the lower reservoir and a second smaller concrete batch plant located near the upper reservoir. The existing access roads would not be modified for proposed project construction or operations.

Although design details have yet to be finalized, the preliminary project design includes measures specifically intended to prevent water seepage/leakage from the system. This includes lining the embankments and base of the upper reservoir with a combination of a geosynthetic liner over concrete, including a sand drainage layer with leak detection system below the liner. Because of its location within the

For purposes of this analysis, we apply the term **seepage** to water flowing through the liner systems of the two reservoirs. We apply the term **leakage** to water flowing from the water conveyance system piping, pumps, power turbines, and related features.

former CGA smelter cleanup site, the lower reservoir is expected to include a pair of geosynthetic liners (dual-lined) over concrete with a sand drainage layer between the bottom liner and concrete to provide redundancy in preventing seepage (FFP 2020a). For both reservoirs, water collected in the drainage layer would be pumped back into the respective reservoir, and the leak detection system would provide an indication of the approximate location of leaks through the liner.

The water conveyance tunnels connecting the two reservoirs would be lined with thick (up to 24 inches) concrete plus a geosynthetic liner to limit seepage into the surrounding bedrock. A drainage layer between the concrete and the synthetic liner would collect seepage and pump it into the lower reservoir. Portions of the conveyance tunnels, particularly near the lower reservoir inlet/outlet and the draft tubes and penstocks, are also expected to be lined with steel.

Water for construction and operation of the proposed project would be purchased from the Public Utility District No. 1 of Klickitat County, via an existing pump station east of the project footprint (Figure 1) and a subsurface water conveyance system from the pump station to the project footprint. The proposed project would require an estimated 7,640 acre-feet of water (21 cubic feet per second pumped for approximately 6 months) to complete the initial fill of the pumped storage system.

An estimated 360 acre-feet per year (AFY) of make-up water would subsequently be supplied to the system on an as-needed basis to replace water loss from the system. This annual water loss includes an estimated 260 AFY of net loss to evaporation[1] (HDR 2020) and an assumed 100 AFY of leakage from the conveyance and energy-generation infrastructure between the reservoirs (FFP 2020a). The *Surface and Groundwater Hydrology Resource Analysis Report* (Appendix B of the EIS) includes additional discussion of the assumed water balance for the proposed project, which includes the assumption that seepage from the lined reservoirs would be negligible. During operation, the system would have no discharge to waters of the state or of the United States.

During construction, stormwater generated within the project area would be managed in accordance with a National Pollutant Discharge Elimination System (NPDES) Construction Stormwater General Permit (CSWGP), and domestic wastewater would be managed using temporary portable restrooms with wastewaters hauled off and disposed of by the service provider. During operations of the proposed project, stormwater generated from the project area would be anticipated to be managed in accordance with NPDES Industrial Stormwater General Permit using sedimentation and infiltration ponds. Domestic wastewater would likely be managed using one or a combination of an existing sewer system (e.g., system serving aluminum smelter facility if it were rehabilitated to meet current standards and permitted in accordance with all requirements of WAC 173-240 and WAC 173-220) or an on-site septic system permitted by Klickitat County Health Department.

Removal of WSI Under Prospective Purchaser Consent Decree

The Applicant is in consultation with Ecology and the Washington State Attorney General's Office regarding entering into a prospective purchaser agreement (PPA) to complete remediation for a portion of the former CGA smelter cleanup site—namely, full removal of the WSI (SWMU 4)—that is located within the proposed project footprint as shown in Figure 5. Obtaining a PPA requires that the settling party (the Applicant) bring substantial new and tangible (not

> Under state law, a **Prospective Purchaser Agreement (PPA)** is a "settlement with a person not currently liable for contamination at a facility who proposes to purchase, redevelopment, and reuse that facility" (Ecology 1994)

[1] Estimated 390 AFY of evaporation minus 130 AFY of precipitation falling within the combined reservoir footprints.

speculative) resources that result in expediting cleanup of a site that would otherwise not occur or would occur much more slowly without the PPA. If approved, the PPA would be implemented and enforced by means of a prospective purchaser consent decree (PPCD) between the state and the Applicant.

In April 2020, Ecology issued a letter stating that "Ecology believes that it is in the public interest and consistent with Revised Code of Washington (RCW) 70.105D.040(5) to begin work with the applicant toward development of a PPCD for this project" (Ecology 2020). In June 2021, the Applicant submitted a PPA Detailed Proposal (ERM 2021a) and a projected schedule to Ecology that detailed activities that would be covered by the PPA (including full removal of the WSI).

In November of 2021, the Applicant submitted a draft RI/FS and a draft CAP to Ecology for the portion of the Columbia Gorge Aluminum site that they propose to purchase for the project (ERM 2021b, 2021c). The Applicant and Ecology will continue work to develop the CAP and negotiate a PPCD under which the Applicant would complete the necessary remediation work. However, this would be subject to public comment on the PPCD 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 RCRA 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 component of the RCRA cover system, which was not in contact with the WSI wastes, would be reused on site if, based on chemical testing, it complies with applicable MTCA cleanup standards. The remaining components of the RCRA 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.

The existing subsurface information indicates that removal of the WSI can be accomplished without encountering the UA water table. The Applicant has proposed to monitor water levels closely throughout excavation to avoid encountering groundwater. The excavation would not be backfilled pending construction of the proposed lower reservoir, but signage/safety fencing would be installed as required to meet safety requirements during subsequent construction.

The proposed cleanup would also require decommissioning of all existing monitoring wells within the proposed project footprint, including those used to monitor the east-adjacent SWMU 13. Following construction, the proposed cleanup would install replacement monitoring wells in numbers and locations required by Ecology (ERM 2021a).

The planned PPA process would be consistent with all MTCA requirements. This would include the Applicant preparing for Ecology review and approval an RI/FS and then a CAP specific to their project, which would then be implemented under the planned PPCD. The RI/FS, CAP, and PPCD would be made available for public review and comment prior to being finalized. Prior to cleanup implementation under the PPCD, the Applicant would prepare for Ecology review and approval an Engineering Design Report and/or other reports describing the planned means and methods for cleanup construction and compliance monitoring.

Any remediation activities conducted under a PPCD would be exempt from the procedural requirements of certain state and local permits. However, the work must still comply with the substantive requirements of those laws, permits, or approvals. In addition, the remediation work would not be exempt from obtaining applicable federal permits (WAC 173.340.710(9)). All components of the proposed project completed outside of a PPCD (i.e., non-remediation activities) would be subject to all applicable federal, state, and local permits.

3.3.1 Impacts from Construction

This section describes potential direct and indirect impacts to environmental health within the study area that would result from construction of the proposed project including equipment and material staging areas.

3.3.1.1 Direct Impacts

3.3.1.1.1 Reservoir Damage, Breach, or Failure

There would be no potential for adverse impacts resulting from damage, breach, or failure of the proposed project 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 3.3.2.1.1.

3.3.1.1.2 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 due to disturbance to existing contaminated materials within the former CGA smelter cleanup site, specifically the planned removal of the WSI (refer to Section 3.2.3). There is no evidence that contaminated materials are present in the areas of the underground infrastructure or the upper reservoir area. In addition, the proposed project would not disturb materials within the rest of the smelter cleanup site.

The planned complete removal of the WSI conducted in accordance with MTCA would involve handling and permanent 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 removal action would also occur in proximity to contaminated materials present in the West SPL Storage Area (capped) and the ditch immediately south of it, and in proximity to the Plant Construction Landfill, for which there has been no evidence reported of contaminated materials (Figure 5). The proposed project footprint does not include these three proximal areas (Figure 5) and it is assumed that the proposed project, including removal of the WSI, would not affect them.

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 gases from the WSI.

As with any cleanup action, the disturbance and direct handling of contaminated materials in the WSI, including disturbance from support/staging activities conducted 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. The MTCA process for planning and executing the proposed removal of the WSI would entail a public comment period for the draft CAP and PPCD. Also, SEPA regulations require that an environmental determination for the remedial actions be made no later than issuance of the draft CAP. Ecology plans to use environmental documents previously prepared (such as this EIS) in evaluating the proposed remedial actions. Under the terms of the PPCD, the Applicant will implement the CAP. This will include Ecology oversight of the remedial actions, including approval of the cleanup engineering design report, confirmation monitoring, and compliance monitoring.

Implementation of the cleanup would include best management practices for temporary erosion and sedimentation control, dust control, prevention of spills of hazardous materials (e.g., fuels) used during construction, and preventing track out and deposition of contaminated materials outside of 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 CSWGP. The permit would 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 of the monitoring data 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 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 of the EIS) proposes preparation of a Construction Water Resource Monitoring and Response Plan as a mitigation measure. This Plan would be implemented during construction of the proposed project. This Plan would provide an integrated program to monitor water quantity (hydrology) and water quality (all pertinent parameters) for groundwater and surface water associated with the proposed construction project. It would also define metrics for determining the presence and degree of impact, and thereby allow empirical determination of the presence and magnitude of adverse impacts during construction. 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.

The project area is located relatively close to landfills (located in Roosevelt, Washington, and Arlington, Oregon) permitted to accept the waste that would be excavated from the WSI area, which would minimize risk associated with transporting the waste to the disposal facility.

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 from the former CGA smelter site a large quantity of contaminated materials 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.

Conclusion

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.

3.3.1.1.3 Physical Safety Risks

Given the isolated location of the proposed project, the potential temporary impacts to human physical safety resulting from its construction include worker injury, including work-related traffic accidents, as well as 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. These could include but not be limited to the following measures:

- Reducing clutter on the work site
- Maintaining line of sight and other communication methods with equipment operators
- Implementing lock out/tag procedures for electrical work
- Practicing ladder safety and using fall protection where appropriate
- Taking proactive steps to prevent hypo- or hyper-thermia
- Maintaining hydration and nutrition
- Implementing ergonomic measures to limit muscle strain and repetitive stress injuries

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, including heavy equipment. 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/masticating it on site.

Robust dust control measures would be required by Ecology (see the *Air Quality and Greenhouse Gases Resource Analysis Report* [Appendix D of the EIS; Trinity 2022] and Section 3.3.4) 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.

Conclusion

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.

3.3.1.1.4 *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, power turbines)
- Truck traffic to and from the construction site

All construction activity, including reservoir blasting, would happen between 7:00 a.m. and 10:00 p.m. unless a variance is granted, consistent with WAC 173.60.050 and Klickitat County regulations. These rules allow for construction and blasting noise if conducted during daytime hours. A list of construction equipment L_{max} noise levels for equipment expected to be used during project construction is in Table 4.

Table 4
Typical Noise Levels of Common Construction Equipment

TYPE OF EQUIPMENT	TYPICAL SOUND LEVEL AT 50 FEET (DBA) LMAX
Impact pile driving	101
Blasting	94
Crane	81
Grader	85
Rock drill	81
Dozer	82
Chain saw	84
Pickup truck	75
Dump truck	76
Generator	70
Concrete batch plant	83
Front-end loader	79
Compactor	83
Backhoe	78

Source: FHWA 2006

The highest noise level from construction activities, assuming 40% use of graders and 1% use of blasting, was estimated to have an L_{max} value of 61.5 dBA and an L_{eq} value of 49.3 dBA at 2,112 feet (FHWA 2006). Normally acceptable noise levels in rural/recreational areas range from 55 to 60 dBA L_{max} (WAC 173.60.040).

There are no homes in or immediately adjacent to the proposed project area. Scattered farm residences are west and north of the northern extent of the proposed project. The closest sensitive land use to the proposed facility construction, a residence, is approximately 2,112 feet (0.4 mile) to the west of the lower reservoir, off SR 14. The nearest receptors to the proposed upper reservoir are infrequently used agricultural buildings to the north, approximately 1.2 miles from the upper reservoir (FFP 2020a).

Vegetation, hills, and distance would shelter 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 from some noise from construction and blasting, and actual noise levels would be lower. Canyon-shaped areas where noise is reflected would likely shorten the distance at which noise-related disturbance could occur. Impacts to terrestrial and aquatic species from construction noise and vibration are discussed in the *Terrestrial Species and Habitats Resource Analysis Report* (Appendix G of the EIS; Anchor QEA 2022a) and *Aquatic Species and Habitats Resource Analysis Report* (Appendix F of the EIS; Anchor QEA 2022b).

Construction activities would also have the potential to result in noise effects from truck traffic. Additional truck round trips are expected to and from the construction site compared to existing conditions. At 50 feet heavy trucks are expected to generate an Lmax of 75 dBA. Although this would be an increase in noise compared to existing conditions, the anticipated access road routes are located in mainly rural, unpopulated areas with very few people who could be affected by noise. Therefore, this increase is anticipated to be low.

Increased noise may also affect workers in the area. Workers would be in the construction area and would experience higher noise levels than the nearest residence. Noise from blasting could be as high as 94 dBA at 50 feet from the activity. Noise from grading could be as high as 85 dBA at 50 feet from the activity. Workers would wear hearing protection to minimize the impacts of noise.

The United States Bureau of Mines has established a PPV of 2.0 inches per second at the closest structure to prevent structural damage. However, some buildings, depending on age or construction materials, may be more susceptible to vibration. The construction vibration damage criterion for buildings that are extremely susceptible to vibration damage is a PPV of 0.12 inches per second. This is the strictest PPV vibration threshold established by the Federal Transit Administration (FTA 2018).

Vibration from construction of the facility is not expected to affect any nearby structures because vibration levels for common construction equipment would be below FTA requirements (Table 5). The nearest structures are located within 500 feet of the lower reservoir footprint but are part of the decommissioned smelter plant and not in use (Tetra Tech et al. 2021). Electrical infrastructure is located approximately 2,100 feet away. Vibration levels from project construction equipment at 25 feet would generally be less than established safety criteria for structures 25 feet away. Wind turbines are located within and immediately adjacent to the upper reservoir project footprint. To reduce the effects of construction vibration on wind turbines, the Applicant intends to implement best management practices and to develop a construction vibration monitoring program, including definition of vibration criteria, to ensure no damage to those existing wind farm facilities and no interruptions to their operation (FFP 2020a).

Table 5
Vibration Velocities for Construction Equipment

EQUIPMENT	PPV AT 25 FEET (INCHES PER SECOND)
Loaded trucks	0.076
Jackhammer	0.035
Large bulldozer	0.089
Small bulldozer/backhoe	0.003

Source: FTA 2018

The Applicant has also proposed noise control measures—that would include conducting high noise activities simultaneously when feasible and equipping noisy equipment with noise control features when possible—as part of their draft Wildlife Management Plan (WMP; see the *Terrestrial Species and Habitats Resource Analysis Report* [Appendix G of the EIS] and Section 3.3.4) which would also further reduce potential noise impacts to environmental health.

With appropriate control measures and monitoring programs in place and as required by permits, the temporary construction-related noise and vibration effects on workers and a nearby resident would not result in a significant impact.

3.3.1.2 Indirect Impacts

No indirect impacts on environmental health elements are identified.

3.3.2 Impacts from Operation

3.3.2.1 Direct Impacts

3.3.2.1.1 Reservoir Damage, Breach, or Failure

The 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 and thereby 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.

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 2020). Given the proposed design of the two lined reservoirs, with the lower reservoir proposed to be dual-lined, seepage is expected to be negligible as described further in the *Surface and Groundwater Hydrology Resource Analysis Report* (Appendix B of the EIS). Therefore, impacts due to the potential for a breach or failure of the reservoirs' large above-grade embankments (175 feet high for upper reservoir, 205 feet high for lower reservoir) are considered in this analysis.

Breaches of either reservoir's large aboveground 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 and, for low rates of discharge, infiltrate to shallow groundwater or, for higher rates of discharges that overwhelm the surrounding soils' infiltration capacity, runoff as stormwater. As described in Section 3.3.2.1.5 of the *Surface and Groundwater Hydrology Resource Analysis Report*, the quality of water within the system is expected to degrade over time as dissolved constituents (e.g., salts, nutrients, and metals) become more concentrated by evaporation. Because the system would regularly circulate water between reservoirs during normal operation, the water quality in each reservoir is expected to be essentially equivalent at any given time during operations.

Because the water quality within the reservoirs is expected to degrade gradually as operations proceed, 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, the shallow groundwater system currently provides insufficient baseflow to sustain the ephemeral/intermittent headwater tributaries of Swale Creek that are at least 15 river miles upstream of the fish-bearing portion of Swale Creek (refer to Section 3.3.2.1.5 of the *Surface and Groundwater Hydrology Resource Analysis*

Report). This small discharge of water from a breach of the upper reservoir embankment would not result in a significant adverse impact to water quality.

In the lower reservoir area, the existing groundwater is contaminated (AOC 2; Table 3). Therefore, in the event of a low-volume discharge from a breach of the lower reservoir, the primary impact resulting from the added infiltration recharge to the UA would be altering the flow direction of the existing contaminated groundwater (sulfate/fluoride plumes). The existing flow direction would be expected to be reestablished relatively quickly once a small volume of added recharge ceased.

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 entirely 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 2020). In the improbable event of 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 its operational lifetime. FERC's Engineering Guidelines for the Evaluation of Hydropower Projects (FERC 2020) establishes procedures for developing a Geotechnical Investigation, Emergency Action Plan, Construction Quality Control Inspection Program, Determination of Probable Maximum Flood, Instrumentation and Monitoring including water conveyance (e.g., tunnels and penstocks), Evaluation of Earthquake Ground Motions, and other elements.

Under the FERC dam safety protocols, applicants for hydropower projects under FERC's jurisdiction are required to develop and file an Emergency Action Plan (EAP) for reservoirs. EAPs contain six basic elements:

- Notification Flowchart and Contact Information
- Emergency Detection, Evaluation, and Classification
- Responsibilities
- Preparedness Activities
- Inundation Maps
- Appendices

The EAP will be shared with local emergency management agencies responsible for developing community emergency response plans. The EAP 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 EAP 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 EAP 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.

Prior to start of project construction, FERC must review and approve the licensee's Construction Quality Control Inspection Program. The Construction Quality Control Inspection Program requires definition of the following:

- Responsibilities, qualification, and authority for personnel conducting construction quality control
- Field testing and laboratory testing to be conducted for the various project elements
- A schedule for construction
- An inspection plan to verify that construction work is performed in conformance to the approved contract documents
- Procedures for erosion control and environmental compliance. FERC guidelines also require that personnel responsible for conducting construction quality control inspections be independent from personnel responsible for project construction.

Inspections are required during dam construction to ensure the licensee's engineer is properly implementing the construction inspection plan. To conform to the requirements of FERC's Dam Safety Performance Monitoring Program, the Applicant must prepare and file the following:

- Supporting Technical Information Document
- Potential Failure Mode Analysis
- Development of a Surveillance and Monitoring Plan

The licensee is also responsible for providing periodic and final construction reports to FERC.

Following dam construction, an independent consulting engineer, approved by FERC, must, every 5 years, inspect and evaluate dams higher than 32.8 feet or with a total storage capacity of more than 2,000 acre-feet. 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 2020).

Because of the engineering rigor required by the FERC licensing and approvals process, the close oversight throughout the design and construction process, and the stringent requirements for dam surveillance and monitoring throughout operations, there would be an extremely low probability for failure, and a low probability for a smaller breach, of either reservoir embankment in the proposed project.

Conclusion

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.

3.3.2.1.2 Release of Contaminants to the Environment

The potential for long-term impacts to environmental health due to contaminant release to the environment would be greatly diminished once the proposed project is constructed and in operation. The proposed excavation of the WSI would remove all of the contaminated waste materials identified in the proposed project footprint. However, the existing contaminated groundwater in the UA (cleanup site AOC 2; Table 3), whether historically generated from the WSI or the adjacent West SPL Storage Area (Figure 5), would persist into the proposed operations period.

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 as a result of the proposed project, whether from WSI removal or other activities, and that migration of the groundwater contamination posed a threat to human health or the environment, remedial response actions (with specifics defined based on location, contaminant type, etc.) could be implemented under MTCA to mitigate the risk.

The *Surface and Groundwater Hydrology Resource Analysis Report* (Appendix B of the EIS) proposes preparation of an Operations Water Resource Monitoring and Response Plan as a mitigation measure. This Plan would include monitoring of water quantity (hydrology) and water quality during long-term operation of the proposed project. The proposed Plan would likely be prepared independent of the proposed WSI removal action under MTCA, but it may overlap with MTCA monitoring requirements and locations, similar to the construction plan, to achieve a comprehensive and efficient program overall.

The Plan would provide an integrated program to monitor water quantity (hydrology) and water quality for groundwater and surface water associated with the operational proposed project. The Plan would also define metrics for determining the presence and degree of impact, and thereby allow empirical determination of the presence and magnitude of adverse impacts during operations.

Conclusion

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.

3.3.2.1.3 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 relative to the construction period. Because of the anticipated nature of operation and maintenance work to be conducted, workers operating the system would generally be less susceptible to physical injury. Project operations should also involve limited if any substantive use of ignition sources outdoors.

Conclusion

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.

3.3.2.1.4 Noise and Vibration

Operational noise from the proposed project is expected to be negligible. There would be periodic noise and vibration, primarily from the turbine-generator system and maintenance activities. Noise would also be generated from periodic truck movements and the temporary use of heavy tools and 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 would not be elevated beyond 500 feet from project infrastructure (FFP 2020a). This means that background noise levels are not expected to change for a nearby residence (0.4 mile away). 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. Because of the rural location of the study area, no specific mitigation is proposed to reduce noise and vibration during operation.

Conclusion

Impacts from operational noise would not be significant.

3.3.2.2 Indirect Impacts

No indirect impacts on environmental health elements are anticipated.

3.3.3 Required Permits

The following permits related to environmental health would be required for construction and operation of the proposed project:

- **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 on the CSWGP for the proposed project. The CSWGP 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. The *Surface and Groundwater Resource Analysis Report* (Aspect Consulting 2022) describes stormwater permits for project operations when contaminated materials would not be handled.
- **Section 402 Clean Water Act NPDES Industrial Stormwater Permit (Ecology):** The proposed action 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.
- **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.

- **Hydropower 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 includes design and construction in accordance with required FERC dam safety protocols for the dams, powerhouses, and other structures associated with operation and generation of electric through hydropower. The license process includes preparation of an EAP, 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.

As stated in Section 3.3.1, proposed remediation activities conducted under a PPCD would be exempt from the procedural requirements for certain state and local permits but would need to comply with substantive requirements of such permits.

3.3.4 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 discussed in Section 3.3.3.

Relevant Mitigation Measures in Other Resource Reports and 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 of the EIS and the *Surface and Groundwater Hydrology Resource Analysis Report* (Appendix B of the EIS) and *Wetlands and Regulated Waters Resource Analysis Report* (Appendix C of the EIS; Anchor QEA 2022c) 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 of the EIS).
- **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 of the EIS).

The following is a brief summary of relevant Ecology-proposed air quality and GHG mitigation measures; Section 4.3.2.3 of the EIS and the *Air Quality and Greenhouse Gases Resource Analysis Report* (Appendix D of the EIS) 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 of the EIS).

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 of the EIS and the *Terrestrial Species and Habitats Resource Analysis Report* (Appendix G of the EIS):

- **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 of the EIS).

3.3.5 Significant and Unavoidable Adverse Impacts

There would be no significant and unavoidable adverse impacts related to environmental health within the study area from construction or operation of the proposed project.

3.4 No Action Alternative

The No Action Alternative represents the future conditions related to environmental health within the study area in the absence of implementing the proposed project. In the No Action Alternative, the proposed project facilities would not be constructed. Investigation of contamination and development of cleanup actions for the former CGA smelter site would continue through the separate MTCA cleanup process under Ecology oversight in accordance with the site's AO (refer to Section 3.2.3). 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, the FS 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 maximum extent practicable as defined by MTCA. Ecology would present their proposed decision in their CAP for the entire site, which would then be subject to public review and comment.

As described in Section 3.2.3.1, the WSI was constructed with a geosynthetic underliner beneath the impounded wastes. In 2004, the WSI was properly closed (capped) under an approved RCRA closure plan and, since then, has been maintained and monitored. The post-closure monitoring of the WSI suggests that the closure has been generally effective in preventing human exposure to waste materials and reducing contaminant leaching from the WSI wastes to underlying groundwater.

Therefore, for purposes of evaluating the No Action Alternative, it is assumed that the MTCA disproportionate cost analysis conducted as part of the FS 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 PPCD that states "It also appears that the proposed project would bring new resources to the cleanup of the Columbia Gorge Aluminum 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.

There would be no significant adverse impacts to environmental health under the No Action Alternative.

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