Yale Hydroelectric Project
FERC Project No. P-2071

Before the
United States of America
Federal Energy Regulatory Commission

Draft Application for License Amendment

Volume I of IV
Initial Statement and Exhibits A, C, D, and R

PACIFICORP
A BERKSHIRE HATHAWAY ENERGY COMPANY

December 2022

Yale Hydroelectric Project
(FERC No. P-2071)

APPLICATION FOR LICENSE AMENDMENT

This application for license amendment for the Yale Hydroelectric Project (FERC No. P-2071) consists of the following volumes:

Volume I

Initial Statement
Exhibit A – Project Description
Exhibit C – Project Installation and Proposed Schedule
Exhibit D – Costs and Financing
Exhibit R – Recreation Facility Drawings

Volume II

Exhibit E – Environmental Report

Volume III

Exhibit F – Vicinity and Preliminary Design Drawings (**CUI//CEII** – Not for Public Release)*

Volume IV

Cultural Resource Summary for the Yale Project (**CUI//PRIV** – Not for Public Release)*

(*Provided under separate cover)

Initial Statement

Yale Hydroelectric Project (FERC No. P-2071)

BEFORE THE
UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION
PACIFICORP PROJECT NO. P-2071

APPLICATION FOR NON-CAPACITY AMENDMENT OF LICENSE
FOR A MAJOR PROJECT - EXISTING DAM

INITIAL STATEMENT

(Pursuant to 18 CFR § 4.201)

1. PacifiCorp (PacifiCorp, Licensee, or Applicant) applies to the Federal Energy Regulatory Commission (FERC or Commission) for a non-capacity amendment of the license for the Yale Project (Project) as described in the enclosed exhibits.

2. The exact name, business address, and telephone number of the Applicant are:

   PacifiCorp
   825 N.E. Multnomah St., Suite 1800
   Portland, Oregon 97232

   The exact name and business address of each person authorized to act as agents for the Applicant in this application are:

   Todd Olson
   Director of Compliance, Renewable Resources
   PacifiCorp
   825 N.E. Multnomah St., Suite 1800
   Portland, OR 97232
   (503) 813-6657
   todd.olson@pacificorp.com

3. The Applicant is a domestic corporation organized under the laws of the State of Oregon and is owner and Licensee for the Yale Hydroelectric Project designated as (FERC No. P-2071) in the records of the Federal Energy Regulatory Commission, original license issued on October 29, 1956. The Commission issued a new license for the Project on June 26, 2008.

4. The amendment of license proposed and the reason(s) why the proposed changes are necessary:

   New Information Regarding Dam Safety
   The results from the 2020 field and laboratory program updated the material characterization for the Saddle Dam. Further model calibration and results of the

deformation model indicate crest deformation and potential cracking of the embankment during a large seismic event. To mitigate against these potential results from a large seismic event, PacifiCorp will complete modifications to the Yale Saddle Dam in support of dam safety objectives.

Requested License Amendment

PacifiCorp seeks a non-capacity amendment to the Yale Project License (FERC No. P-2071) to complete the installation of a rock filter / drain berm to the downstream face of the existing Saddle Dam and add a downstream toe drain and centralized drainage swale to monitor any seepage from Saddle Dam. Modifications will add surfacing material to the crest of the embankment dam extending the toe of the dam approximately 50 feet into the existing recreation site parking lot. The parking lot will be reshaped to maintain pre-project parking capacity. The project will also add rip rap to the upstream face of the dam., Temporary access or storage sites installed during the construction phase will be removed and site area restored. Any permanent recreation site feature removed for construction will be rebuilt or restored to original conditions.

Amendment is necessary to complete construction actions in a timely manner.

Required Exhibits

For this non-capacity amendment, consistent with the requirements of 18 CFR § 4.201(c), only those exhibits applicable to the proposed changes necessary to implement dam safety actions at Yale Saddle Dam are provided.

Exhibit A - Project Description – Enclosed within Volume I

Exhibit B - Project Operations – The non-capacity amendment proposed in this application will have no impact on Project operations and, accordingly, Exhibit B is not provided.

Exhibit C - Project Installation and Proposed Schedule – Enclosed within Volume I

Exhibit D - Costs and Financing – Enclosed within Volume I

Exhibit E - Environmental Analysis – Enclosed within Volume II, appendices to Exhibit E are provided in Volume III

Exhibit F - Project Drawings – Enclosed within Volume IV

Exhibit R – Recreation Facility Drawings – Enclosed within Volume I

(i) The statutory or regulatory requirements of the state in which the project would be located that affect the project as proposed with respect to bed and banks and the appropriation, diversion, and use of water for power purposes are:

- National Historic Preservation Act Section 106 Consultation – Washington Department of Archaeology and Historic Preservation

- In-water Work Protection Plan Approval (requirement of Clean Water Act Section 401 Permit)– Washington Department of Ecology
- General Construction Stormwater Permit – Washington Department of Ecology
- Hydraulic Project Approval – Washington Department of Fish and Wildlife
- Shoreline Substantial Development Permit – Cowlitz County
- SEPA Determination (DNS) – Cowlitz County
- Grading Permit – Cowlitz County
- Clean Water Act Section 404 Nationwide Permit – US Army Corps of Engineers
- Endangered Species Act Section 7 Consultation – US Fish and Wildlife Service and National Marine Fisheries Service

(ii) The steps which the applicant has taken or plans to take to comply with each of the laws cited above are:

PacifiCorp will consult with and apply for appropriate modifications, amendments, or new authorizations per the permit needs and from the entities as presented in prior section 4(i). The full list of permits required to construct will be developed upon final design. PacifiCorp will obtain all necessary permits and authorizations prior to construction.

SUBSCRIPTION

This Application for License Amendment for the Yale Project, FERC Project No. P-2071 is executed in the State of Oregon, County of Multnomah, by Todd Olson, Director of Compliance Renewable Resources, PacifiCorp, 825 NE Multnomah St., Suite 1800, Portland, Oregon, 97232, who, being duly sworn, deposes and says that the contents of this application are true to the best of his/her knowledge or belief and that he/she is authorized to execute this application on behalf of PacifiCorp.

The undersigned has signed his application this ____ day of XXX, 2022.

_____
Todd Olson
Director of Compliance, PacifiCorp Renewable Resources

VERIFICATION

Subscribed and sworn to before me, a Notary Public of the State of Oregon this _____ day of XXX, 2022.

_____
Notary Public – TBD

My Commission Expires _____

EXHIBIT A – PROJECT DESCRIPTION

Yale Hydroelectric Project
(FERC No. P-2071)

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Note to reader – This document revises the current Yale Hydroelectric Project Exhibit A on file with the Federal Energy Regulatory Commission. All proposed revisions are identified in track changes.

A.1.0 Introduction

In compliance with the Code of Federal Regulations (18 CFR, Parts 4 and 16), PacifiCorp Energy applied to the Federal Energy Regulatory Commission (FERC) to re-license the Yale Hydroelectric Project, FERC Project No. P-2071, which PacifiCorp Energy currently owns and operates, on the North Fork Lewis River, in the State of Washington. The initial license for the Yale Project was issued on April 30, 1951 and expired on April 30, 2001. The current license, effective June 1, 2008, and expiring May 31, 2058, was issued under Order Issuing New License (123 FERC ¶62,257) on June 26, 2008. An Order on Rehearing (125 FERC ¶ 61,046) was issued October 16, 2008.

Exhibit A – Project Description

This Exhibit A is a description of the Yale Project. It includes the location, general configuration, physical composition, and dimensions of the project structures. The description also includes information on the turbine-generator unit, as well as appurtenant civil, mechanical, and electrical equipment.

Exhibit A is organized in five sections that follow the sequence of information requested in the CFRs. Following this introduction, the existing facilities are described in Section 2.0. In Section 3.0, proposed modifications are described. Section 4.0 contains a statement regarding lands of the United States within the project boundary. Section 5.0 contains reference cites.

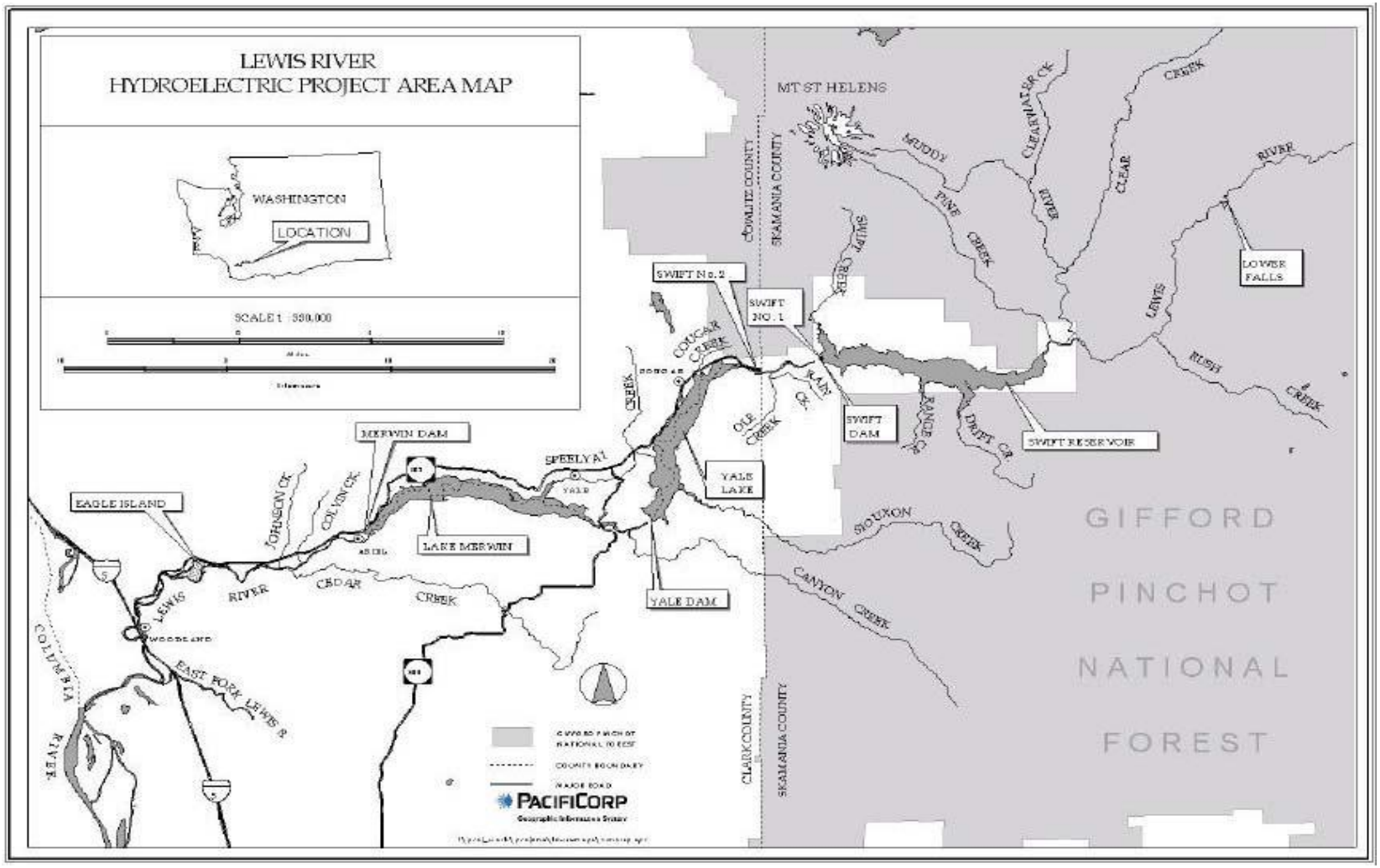

Figure A.1.0-1 Lewis River Hydroelectric Projects Area Map

A.2.0 Existing Structures

The Yale Hydroelectric Project is located on the North Fork Lewis River at the upstream end of Lake Merwin at river mile (RM) 34. The site is approximately 23 miles east of Woodland, Washington and 45 miles northeast of Portland, Oregon, about 35 miles upstream of the confluence of the North Fork Lewis River with the Columbia River. The Yale Project location within the North Fork Lewis River drainage basin is shown on Figure A.1.0-1.

The major components of the Yale Project include a reservoir, a main embankment dam, a low earth-fill Saddle Dam, a concrete chute-type spillway, and a 2-unit powerhouse. The significant project data are listed in Table A.2.0-1. A description of the civil, mechanical, and electrical systems for the major project components and their physical and operating conditions are as follows.

Table A.2.0-1 Yale Project Data

GENERAL		
Plant Name	Yale	
FERC Project No./License Expiration	2071/2001	
Location	Yale, Washington	
Stream Name	North Fork Lewis River	
Minimum Flow Requirement (cfs)	None	
Plant Data		
Plant Capacity, kW at 0.90 PF	134,000	
Number of Units	2	
Rated Net Head	240 feet	
Plant Discharge	9,640 cfs	
Average Annual Generation (Gross)	553,947 MWh (30-years 1958-1987)	
CIVIL SYSTEMS		
Reservoir		
Name	Yale Lake	
Drainage Area	596 square miles	
Maximum Storage Capacity @ El. 490 ft	402,000 ac-feet	
Usable Storage Capacity	190,000 ac-feet	
Maximum Normal Elevation	490.0 feet msl	
Normal Summer Operating Elevation	490.0-480.0 feet msl	
Normal Minimum Operating Elevation	470.0 feet msl	
Minimum Operating Elevation	430.0 feet msl	
Minimum of Record	435.65 feet msl (February 1957)	
Minimum Pool	430.0 feet msl	

Dams		
Name	Yale dam	Saddle dam
Type	Zoned embankment	Zoned embankment
Height	323 feet	40 feet
Length	1,500 feet	1,600 feet
Instrumentation	Crest monuments, Vee-notched weir,~~**Abutment**~~ piezometers	**Crest monuments,** ~~**Downstream**~~ piezometers
Diversion Tunnel		
Size	30-foot diameter horseshoe shaped	
Length	1,530 feet	
Liner Type	Concrete	
Other Features	Concrete plug at 1,276 feet from outlet	
Future Intake		
Location	81 feet north of diversion tunnel plug	
Features currently present	Circular cofferdam and rock formation grouting	
Cofferdam Outside Diameter	76 feet	
Cofferdam Top Elevation	431.3 feet msl	
Intake Structure		
Width	95 feet	
Length	38 feet	
Height	100 feet	
Intake Invert Elevation	400 feet msl	
Gates		
Number	2	
Type	Roller bulkhead	
Size	13.33 x 17 feet	
Hoist Capacity	100 tons	
Instrumentation (monitoring discontinued since 1997 Part 12) Inspection)	Tilt plates (2) Float wells	
Intake Fish Barrier Net		
Mesh Size	½ inch	
Length	700 feet	
Height	95 feet	
Penstocks		
Diameter	Varies-16 to 18.5 feet	
Length	1,111 feet (Unit 1) 1,206 feet (Unit 2)	
Liner Type	Unit 1	Unit 2
	Steel (985 feet) Concrete (126 feet)	Steel (1,093 feet) Concrete (113 feet)

Powerhouse		
Type	Semi-outdoor	
Width	151 feet	
Length	57 feet	
Draft Tube Gates		
Type	Slide	
Size	10’1.5" x 17’11"	
Gantry Crane		
Type	Outdoor	
Span	65 feet	
Main Hook Capacity	235 tons	
Auxiliary Hook Capacity	30 tons	
Draft Tube Gates Hoist Capacity	10 tons	
Spillway		
Type	Gated concrete ogee/chute	
Crest Length	195 feet	
Crest Elevation	460 feet msl	
Gates		
Number	5	
Type	Tainter	
Size	39 x 30 feet	
Fish Barrier Net	370 feet x 55 feet	½” mesh
Discharge Capacity	194,000 cfs (PMF) at pool elevation 501.2 feet	
Tailrace	Lake Merwin	
Plant Access Road		
Length	2.2 miles (from State Route 503)	
Surface Type	Asphalt/gravel	
Concrete bridge over spillway chute	110 foot span	
MECHANICAL SYSTEMS		
Turbine		
Unit Number	1	2
Manufacturer	S. Morgan Smith/ American Hydrorunner	S. Morgan Smith/American Hydrorunner
Turbine Capacity	73,300 kW at 240 feet	73,300 kW at 240 feet
Maximum Turbine Discharge	4,820 cfs at 240 feet	4,820 cfs at 240 feet
Maximum Turbine Output	86,800 kW at 240 feet	86,800 kW at 240 feet
Type	Vertical Francis	Vertical Francis
Speed (nameplate)	150 rpm	150 rpm
Runner Discharge Diameter	144 inches	144 inches
Wicket Gate Circle Diameter	173 inches	173 inches
Wicket Gate Height	32.25 inches	32.25 inches

Distributor Centerline Elevation	236.0 feet msl	236.0 feet msl
Draft Tube Type	High moody spreading- cone	High moody spreading- cone
Year Disassembled and Overhauled	1986 turbine overhaul 1996 turbine overhaul, runner replaced	1987 turbine overhaul 1995 turbine overhaul, runner replaced
Governor	Woodward cabinet	Woodward cabinet
Piezometer Taps		
Spiral Case Inlet	4-1/4" Orifices	4-1/4" Orifices
Winter-Kennedy	4-1/4" Orifices	4-1/4" Orifices
Lube Oil Systems	Turbine guide bearing Thrust/generator lower guide bearing Upper generator guide bearing	Turbine guide bearing Thrust/generator lower guide bearing Upper generator guide bearing
High-Pressure Lift System	Yes	Yes
Cooling and Service Water System	Generator cooling Thrust bearing cooling Seal water	Generator cooling Thrust bearing cooling Seal water
Draft Tube Depression System	Yes	Yes
Compressed Air System		
Compressors		
Number	2	
Manufacturer/Model No.	Gardner-Denver/WBE 1006	
Speed	870 rpm	
Number of Cylinders	2	
Motors		
Type	Induction	
Manufactured/Model	GE/5K 1445BX4	
Capacity	40 hp	
Speed	875 rpm	
Air Receivers		
Number	2	
Volume	110 cubic feet (each)	
Plant Drains and Dewatering System		
Plant Sump Dimensions, (LxWxH)	7.5’x 13’x 48’	
Sump Pumps		
Number/Type	1/Vertical	
Capacity	1,000 gpm	
Motor	25 hp	
Dewatering Pumps		
Number/Type	2/Vertical	
Capacity	5,000 gpm (each)	
Motor	125 hp	
Oil Separation Provisions	None	

Domestic Water and Sanitary Waste System		
Domestic Water	Chlorinated Service and Cooling Water	
Water Heater Number/Capacity	1-80 gallons 1-25 gallons	
Sanitary Waste Treatment	3,000 gallon septic holding tank	
Fire Detection and Protection		
Plant Fire Detection System	None	
Generator Fire Suppression System	Carbon dioxide (bottles removed)	
Plant Interior Fire Protection System	None	
Sire Fire Protection System	None	
HVAC System		
Heating		
Powerhouse	Rejected generator heat	
Control Room	Electric heater	
Ventilation		
Powerhouse	Natural circulation	
Generator Cover	Ventilation fans	
Air Conditioning		
Control Room	Window unit	
Lube Oil Filtration System		
Filter Type	Bowser Figure 7D Multi-compartment	
Oil Storage Tank Capacity	9,000 gallons	
ELECTRICAL SYSTEMS		
Generator		
Unit Number	1	2
Manufacturer	General Electric	General Electric
Rating		
kVA at 60 C	74,400	74,400
Power Factor	0.90	0.90
Insulation Class		
Stator	F	F
Field	B	B
Generator Capability		
kVA	74,400	74,400
kW at 0.90 PF	67,000	67,000
Temperature Rise, C, Stator	75	75
Temperature Rise, C, Field	80	80
Year Installed	1952	1952
Year Disassembled and Overhauled	1986-Rewind	1987-Rewind
Exciter		
Manufacturer	ABB Model Unitrol "P"	ABB Model Unitrol "P"
Static Excitation System	325 kW at 250 V dc	325 kW at 250 V dc

Bus Duct		
Type	Non-segregated	Non-segregated
Rating, amp/phase	4,000	4,000
Generator Breakers	SF_6 (1992)	SF_6 (1992)
Protective Relays	General Electric	
480 Volt System	Switchgear Station control centers Headgate load center Spillgate load center	
120 Volt System		
Transformers		
Type	Dry/Single Phase	
Voltage	480-120/240 volts	
Rating, kVA	37.5 (Powerhouse 2 total); 15 (Headgate); 15 (Spillways)	
Panelboards	120/240 V	
DC System		
Battery		
Number of Cells	60	
Voltage, V	125 dc	
Rating, amp-hr	240	
Number of Chargers	1 @ 50 amp 1 @ 25 amp	
Panelboard	120 V dc	
Emergency Generator		
Type	Propane Engine	
Voltage	480 volts	
Rating	100 kW	
Transformers		
Station Service Transformers		
Type	Oil-fill/three-phase	
Number	2	
Rating	1,750 kVA (Auxiliary No. 1) 3,750 kVA (Auxiliary No. 2)	
Voltage	13,800/480 volts	
Generator Step-up Transformers		
Number	4 (includes one spare)	
Type	Oil-filled/single/phase	
Rating	138,000 kVA	
Voltage	13,200/115,000 volts	
Manufacturer	General Electric	
Year Installed	1953	

Lighting	Incandescent and fluorescent lamps	
Plant Control and Instrumentation System	Landis and Gyr LG 6800 MODICON PLC	
Communication System	Analog Microwave	
Security	Fencing Locked gates and doors/video cameras	

A.2.1 Civil Systems

A.2.1.1 Reservoir

The reservoir formed by Yale Dam (Yale Lake) is approximately 10.5 miles long and has a surface area of 3,800 acres at elevation 490 feet msl, the normal maximum operating level of the reservoir. The reservoir's gross storage capacity at this elevation is 402,000 acre-feet with a usable storage capacity of 190,000 acre-feet. The drainage area for the reservoir is 596 square miles.

A.2.1.2 Dams

A.2.1.2.1 Yale Dam

The main dam for the project is a zoned embankment resting on bedrock **and alluvium** with a crest length of 1,305 feet and a maximum height of 323 feet. The embankment consists of an upstream sloping central impervious core supported by sandy gravel shells. The upstream surface slope of the dam is 2.5 horizontal to 1 vertical, and the downstream slope is 2 horizontal to 1 vertical. The dam crest is at elevation 503 feet msl. A concrete arch **retaining wall** section is provided at the downstream toe to limit the downstream extent of the dam and permit the powerhouse to be located approximately 150 feet closer to the intake. The arch section is 77 feet high and composed of concrete arch rings.

The instrumentation at the main dam monitors vertical crest movements, seepage flows, and piezometric pressures in the **embankment**~~**left abutment**~~. Twelve monuments along the crest of the dam are surveyed annually by PacifiCorp to monitor dam settlement. Yale Dam and left abutment seepage flows are measured at the vee-notched weir near the powerhouse. Five piezometers are **installed in the left abutment of the dam but are no longer monitored for piezometric levels.** ~~**used to monitor the piezometric levels in the left abutment of the dam.**~~

A.2.1.2.2 Saddle Dam

Saddle Dam is located about 0.25 mile north of the main dam on the right bank. This dam is constructed on **interbedded zones of silty sand to sand gravel (Alluvium), overlying silty gravelly sand (Colluvium) over volcanic breccia. The Saddle Dam** ~~**a sandy clay layer overlaying an alternating sequence of sandy gravel, sandy clay, and sand and**~~ consists of a central impervious core with random fill in the outer shell sections. The saddle dam is 1,600 feet long with a maximum height of approximately 40 feet and 3 horizontal to 1 vertical side slopes. The dam crest is at elevation 503 feet msl. The upstream slope is protected from erosion by a 2 to 3-foot layer of riprap, while the downstream slope ~~**has a grass surface**~~ **is protected by rock that contains an embankment shell beyond the core, rock filter / drain berm, and a toe drain leading to a centralized drainage swale.**

The instrumentation at the Saddle Dam monitors vertical crest movements, and piezometric pressures in the embankment and downstream foundation soils.

A.2.1.3 Diversion Tunnel and Future Intake

A.2.1.3.1 Diversion Tunnel

To implement the construction of the main dam, river flows were diverted past the project through a concrete-lined, 30-foot-diameter, horseshoe-shaped tunnel beneath the right portion of the dam. The diversion tunnel is 1,530 feet long and excavated in rock approximately 90 feet below the base of Yale Dam.

The headworks of the tunnel include an approach channel, approximately 200-feet-long and 100-feet-wide, and a gated inlet structure for control of the river flow to the diversion tunnel during construction of the dam. The inlet structure is constructed of reinforced concrete, has an invert at elevation 245 feet msl, and contains two 16-foot-wide by 23-foot-high closure gates and two 4-foot-wide by 5-foot-high inlet bypass gates. The gated inlet structure section of the diversion tunnel transitions into the 30-foot-diameter, horseshoe-shaped diversion tunnel approximately 60 feet downstream of the tunnel entrance.

The main portion of the diversion tunnel is lined with concrete a minimum of 1 foot thick. The tunnel is plugged at the location of the dam's grout curtain approximately 1,276 feet from the tunnel outlet with a 30-foot-long section of concrete. The rock formation along the tunnel upstream of the plug is also pressure grouted. The tunnel outlet discharges into an open channel adjacent to the end of the spillway concrete apron. The open channel is approximately 50 feet wide and 320 feet long and intersects the main river channel approximately 400 feet downstream from the powerhouse.

A.2.1.3.2 Future Intake

The original project construction included a circular foundation and cofferdam for potential expansion of the project in the future. The center of the future intake is approximately 81 feet from the centerline of the diversion tunnel near the tunnel plug.

The foundation and cofferdam are constructed of reinforced concrete and consist of a ring beam founded on rock with outside and inside diameters of 76 and 64 feet, respectively. The top of the ring beam is at elevation 380 feet msl. The ring beam supports a circular wall that forms the upper portion of the cofferdam. The circular wall has an outside diameter of 76 feet and varies in thickness from 12 to 18 inches. The top of the wall extends to elevation 431.3 feet msl, 1.3 feet above the reservoir's low water level.

Construction for the future intake also included pressure grouting the rock formation below the cofferdam and between the cofferdam to an area downstream of the diversion tunnel plug. Grouting of the rock formation would control groundwater inflow during construction of the future intake structure and connecting tunnel to the existing diversion tunnel.

A.2.1.4 Intake Structure

A.2.1.4.1 Structure

The intake structure is on the left bank of the reservoir near the left abutment of the main dam crest. The intake structure is accessible from a bridge that extends from the plant access road to the structure. The vertical concrete and steel-framed structure is 95 feet wide and 38 feet long. Full height trashracks screen the flow to the turbines, and 2 roller bulkhead gates are provided for dewatering the 2 parallel penstocks constructed in the left abutment. The trashracks are composed of 10-foot by 8-foot steel-framed, removable panels with 2.5-inch by 3/8-inch bars spaced on four-inch centers. The concrete deck of the intake structure is at elevation 500 feet msl and is designed for a 150 pound/square foot live load or an H-20 truck load. The two 17-foot by 13.33-foot rectangular openings to the penstocks at the bottom of the structure have an invert at elevation 400 feet msl, which is 90 feet below reservoir's maximum operating level. An access well and air inlet are also provided downstream of each gate.

~~**Instrumentation at the intake structure allows monitoring of structure movement and reservoir levels. Two tilt plates are installed on the structure to record any deflections which may occur. Float wells are also installed at the intake structure to measure the reservoir level and the differential head across the trashracks. The recorded water levels are wired to the Yale powerhouse control room for observation by the plant operators.**~~ **The intake structure is equipped with instrumentation to measure the reservoir elevation. The water elevations are monitored real time and can be observed remotely by both operations and engineering staff.** No mechanical trash cleaning equipment is installed at the intake structure.

A.2.1.4.2 Gates and Hoists

The intake structure is equipped with two 13.33-foot wide by 17-foot high roller bulkhead gates. The gates are constructed with structural steel members filled with concrete for ballast. The gates are hoist-operated and are used to dewater the penstocks for inspection and maintenance purposes. When the gates are not closed, they are suspended directly above the penstock openings.

The intake structure bulkhead gates are raised and lowered with 100-ton hoists driven by 20 hp motors at a speed of 2 fpm. Each hoist system is designed for outdoor service and is supported from a fixed, structural steel-framed gantry located at each gate slot approximately 30 feet above the intake structure deck. Hoist operation can be controlled locally or remotely from the powerhouse. The hoists have recently been rehabilitated and are in good working condition. The intake structure gate and hoist systems are designed to operate under full unbalanced conditions with the reservoir water level at elevation 490 feet msl.

A.2.1.4.3 Intake Fish Barrier Net

A fish barrier net with ½-inch mesh is located upstream of the intake to reduce entrainment of federally listed fish in the flow through the powerhouse. The net spans approximately 700 feet from a rock anchor on the reservoir bank upstream of the left abutment to a cast-in-place concrete anchor on the crest of the dam. The height of the net is 95 feet near the center of the span. The bottom of the net is weighted by a steel chain and is anchored by six 3,600-pound concrete blocks spaced 50 feet apart. The net is supported by foam-filled floats and is fixed in position.

A.2.1.5 Penstocks

Water is delivered from the reservoir **via intake structure** to the generating units via two penstocks originating at the intake structure and terminating at the turbine spiral cases in the powerhouse. The penstock for Unit 1 is 1,111 feet long, while the penstock for Unit 2 is 1,206 feet long.

The penstocks for the Unit 1 and 2 turbines **are** lined with a 16-foot-diameter steel liner which extended upstream for 282 feet and 247 feet, respectively. The remainder of each penstock is concrete-lined with an internal diameter of 18.5 feet. The steel liners were subsequently extended in both penstocks, and the length of the Unit 1 penstock steel liner is 985 feet, while the steel liner for Unit 2 is 1,093 feet. The diameter of the steel liners varies between 16 and 18 feet with the majority of the extension having an 18-foot-diameter.

The centerline elevations for the penstocks are 409.25 feet at the intake and 236 feet at the powerhouse. The penstocks are horizontal at the intake and extend about 100 feet before dropping at a 9% grade for about 650 feet (measured horizontally). The penstocks then slope at a 52% grade for about 225 feet (measured horizontally) to connect to a 200-foot horizontal section which terminates at the turbine spiral case.

The penstocks are accessible through an 8-foot-high by 10-foot-wide by 110-foot-long access tunnel located at about the midpoint of each penstock. The access tunnel entrance is located on the left abutment immediately downstream of the dam at elevation 340 feet msl. The tunnel is accessible from the powerhouse by a road that crosses the downstream slope of the dam.

A.2.1.6 Powerhouse

A.2.1.6.1 Structure

The powerhouse is parallel to the river on the left bank immediately downstream of the concrete arch which forms the toe of the dam. The concrete, semi-outdoor type structure is 151 feet long and 57 feet wide and houses 2 turbine generator units.

The design and construction of the powerhouse included provisions for the future addition of two similar units downstream. The foundation for the future addition was completed up to elevation 205 feet msl during initial construction.

The turbine floor (elevation 244 feet msl) provides access to the turbine pit and to the lower powerhouse galleries that access the penstocks and draft tubes. The turbine floor also provides space for the turbine generator auxiliary systems including cooling water, compressed air receivers and piping, and station drainage. The powerhouse operating floor (elevation 257 feet msl) is at ground level and provides access to the generators and control room. The operating floor level also includes the governor, motor control center, air compressors, and draft tube depression system controls as well as toilet and locker room facilities and a laydown area for unit maintenance. The roof (elevation 274.5 feet msl) contains hatches for the outdoor gantry crane to access the laydown area, turbine generator units, and the turbine floor level.

The powerhouse is provided with draft tube gates for dewatering the turbine water passageways. The draft tube gates are 10.125 feet high by 17.9 feet wide and are raised and lowered by the gantry crane hoist. The draft tube gates weigh approximately 13,000 pounds each and are designed to be

installed or removed under balanced water conditions. Under normal turbine operating conditions, a 20,000-pound concrete cover beam is placed over the slots to seal the draft tube, and the draft tube gates are dogged off above the draft tube for storage.

A.2.1.6.2 Gantry Crane

The powerhouse facility includes an outdoor type, traveling gantry crane for unit maintenance and raising and lowering the draft tube gates. The crane spans 65 feet across the powerhouse and has main and auxiliary hook capacities of 235 and 30 tons, respectively. A 10-ton hoist is also provided on the downstream end for handling the draft tube gates and concrete draft tube slot cover beams. Crane rails, approximately 195 feet long, allow the gantry crane to travel the full length of the powerhouse and the adjacent unloading area.

A.2.1.7 Spillway

A.2.1.7.1 Structure

The gated spillway is located at the right abutment of the main embankment dam. The spillway comprises three distinct sections (from upstream to downstream): an approximately 73-foot-long, gated, five-bay ogee crested control section; an approximately 349-foot-long transition section (spillway Station 0+51.26 to 4+00), and an approximately 660-foot-long chute section (spillway Station 4+00 to 10+60). The transition and chute sections are concrete-lined. There is a short concrete gravity non-overflow section to the right of the gated spillway structure that connects the gated spillway structure to the right valley abutment. The gated spillway ogee section is a mass concrete structure with a crest at Elevation 460 and is slightly arched at an 800-foot radius with a cross-canyon width of approximately 254 feet, and upstream-downstream base length of approximately 73 feet (normal to the spillway crest centerline). ~~**The concrete gravity, chute type spillway adjoins the right abutment of Yale Dam. The spillway is 1,650 feet long. The length of the spillway is comprised of a 400-foot ogee and transition section, a 650-foot rectangular concrete chute.**~~ **The concrete chute section is** on a 10% grade. **Beyond the spillway chute section, spillway flows are discharged through an exposed rock channel for approximately 540 feet before entering into the original river channel approximately 600 feet downstream of the powerhouse.** ~~**and a 600-foot section of exposed bedrock. The concrete gravity ogee section has a crest at elevation 460 feet msl. The spillway discharges into the river about 1,200 feet downstream of the powerhouse. The downstream section of the spillway is formed in the exposed bedrock and is used for energy dissipation.**~~

An upper spillway bridge provides access to the dam and powerhouse. The bridge is a steel-framed structure with a reinforced concrete deck and is supported by the spillway piers. The bridge is approximately 250 feet long with a deck at elevation 502.75 feet msl and is currently posted as having a 20-ton limit. The design loads used for the bridge were based on 1 of the following conditions:

Lorain MS-254 W Crane Unit loaded with 10 kips on a 30-foot boom at a 20-foot radius; or H-20 Highway Loading, 1 truck on any span, with a 30 percent impact included.

The lower spillway bridge constructed in 1998 provides the primary access to the powerhouse and can also be used to access the dam. The bridge is a prestressed concrete girder structure supported on concrete foundations on the right and left side of the spillway.

A.2.1.7.2 Gates and Hoists

The spillway is equipped with five 39-foot-wide and 30-foot-high motor-operated Tainter gates. Each gate is controlled by a 5 hp motor and is powered from the station service power supply. The spillway gates can be controlled locally or remotely from the Yale powerhouse or the Merwin Control Center. A propane engine type generator, set rated at 60 kW, is installed in a small building adjacent to the spillway to automatically start and provide power for gate operation if the station service power supply is interrupted.

A.2.1.7.3 Spillway Fish Barrier Net

A barrier net is located upstream of the spillway to reduce entrainment of federally listed fish during low-volume spill flows. The net spans the spillway from a rock anchor on the reservoir bank upstream of the right abutment to near the end of a concrete training wall at the left of the spillway. The net is secured to the reservoir bottom by drilled and grouted rock anchors spaced at 25 feet. The net is supported by floats that are supplied by air from a compressor rated at 10 cubic feet per minute located in the spillway control building on the dam. The net is normally maintained in the raised position and it is designed to pass flows up to 6,000 cubic feet per second. At higher flows, the air is released from the floats to lower the net to a submerged position. The valves controlling the supply of air to the net can be operated ~~**remotely from the Merwin Control Center or**~~ locally at the spillway.

A.2.1.8 Tailrace

The powerhouse tailrace is **in the very** ~~**formed by the**~~ upper reach of Lake Merwin. The **downstream** channel is approximately 3 miles long before it opens up into the main body of Lake Merwin. The Merwin dam and powerhouse are approximately 14.5 miles downstream of the Yale powerhouse.

The tailrace channel is naturally rock lined and approximately trapezoidal in shape. The invert of the channel at the powerhouse is about 208 feet and water flows from east to west. The draft tube discharge enters the tailrace perpendicular to the tailrace. At the maximum tailwater level for 2 unit operation under normal conditions, the tailrace water surface is about 210 feet across and the depth is approximately 32 feet.

A.2.1.9 Plant Access Road

The Yale Project is located about 2.2 miles east of State Highway 503. A new access road and bridge crossing the lower end of the spillway chute were constructed in 1998. The access road to the project is paved for a distance of about 1.7 miles from the highway and the remaining portion is gravel surfaced. The gravel surface is scheduled to be chip- sealed in 1999. The original powerhouse access road crosses the spillway bridge and main dam crest, wound around the hill above the powerhouse, and approaches the powerhouse from the downstream side.~~**; it is barricaded and no longer in service.**~~ Access to the powerhouse is **also** ~~**currently**~~ provided on the **right** downstream face of the main dam and begins in the vicinity of the spillway bridge. This route was formerly used as emergency access to reach the powerhouse and spillway gates. A gravel surfaced parking area is provided at the powerhouse for employees and visitors.

Access to the Saddle Dam is provided by a second 0.75-mile-long paved road branching off the project access road at a point approximately 1 mile from State Highway 503.

A.2.2 Major Mechanical Systems

A.2.2.1 Turbine

The Yale powerhouse contains 2 vertical Francis turbines, manufactured by S. Morgan Smith Company and installed in 1953.

The original rating of the turbines was 80,500 hp at 250-foot net head and 150 rpm. The Unit No. 2 and No. 1 turbine runners were replaced in 1995 and 1996, respectively. Runner replacement increased each turbine's capacity to 73,300 kW (98,250 hp) at a net head of 240 feet. Unit speed remains the same at 150 rpm.

The Unit No. 2 turbine-generator set has a peak efficiency of 89.1 percent at 73 MW (82 percent wicket gate position). This is an increase in unit efficiency of 7.1 percent over the previous runner at the respective maximum efficiency point. In addition, the maximum output of the unit increased by 17.5 MW (an increase of 27.2 percent) from 64.3 MW to 81.8 MW. The ability to pass additional flow through the unit increased from 4,239 cfs to 4,820 cfs (at a net head of 240 feet) at maximum wicket gate opening. The new turbine runner exceeds both the manufacturer's contractually guaranteed turbine output and the turbine efficiency guarantees.

A formal acceptance test was not performed on Unit No. 1 following installation of the new runner. A comparison of the 2 identical runners was made by observing the gate position, outputs, and flows of both units during operation. In this manner it was confirmed that both runners are identical and are performing with similar capabilities and efficiencies. Performance tests have been conducted on Yale Unit No. 2 to determine the actual performance of the replacement runner during commissioning of the unit.

Each turbine is provided with a carbon steel spiral case and elbow moody draft tube, both with **personnel**~~**man**~~ doors for maintenance access. The turbine distributor includes the cast steel stay ring having 20 vanes, 20 cast carbon steel wicket gates, embedded fabricated steel discharge ring, carbon steel fabricated head cover, gate ring, and gate mechanism operated by 2 double-acting servomotors. A shell type oil-lubricated guide bearing and mechanical packing box are supported on the head cover. The turbines are designed to operate in air with the draft tube depressed as a synchronous condenser or motor and are provided with piping and systems for runner seal cooling water. Each turbine pit is provided with a gravity drain through a stay vane to drain leakage water to the station sump.

A.2.2.2 Governor

A Woodward cabinet actuator style mechanical hydraulic governor is provided to serve Units 1 and 2. Governor systems for both units are housed in a single cabinet between the 2 units. The governor systems are normally operated as one common system but can be operated as separate systems. Two 150-gpm horizontal rotary gear type hydraulic pumps driven by 40-hp motors maintain pressure in two 900-gallon pressure tanks. Nominal system pressure is 300 psi. A permanent magnet generator (PMG) mounted on top of the generator provides the speed signal to

the governor. Trip and reset speeds are 187 rpm and 157 rpm, respectively (per Woodward drawings). A speed switch which closes at 30 rpm is also located in the PMG, and a second speed switch is used to lock out the creep detection circuits.

The governor is provided with the following controls and instruments:

Controls	Instruments
Speed droop control	Tachometer
Gate limit control	Air brake pressure gauge
Speed adjust control	Oil pressure gauge
Air brake control	Gate limit and position indicator
Transfer valve	Speed adjust position indicator
Isolating valve	Isolating valve indicator
Oil pump echelon	Oil level gauge
Oil pump continuous/intermittent	
Creep detector	

A manually operated water-driven emergency oil pump can be used to close the turbine wicket gates in the event of loss of oil pressure.

A.2.3 Major Electrical Systems

A.2.3.1 Generator

The Yale generators were manufactured by General Electric and installed in 1953. Each generator was originally rated at 60,000 kVA, 13,200 V, 60º C maximum temperature rise and was capable of 115% continuous overload to 69,000 kVA. The generator rotors and stators were originally constructed with Class B insulation, which insulation has a limiting temperature rise of 80 C. The generator stators have been rewound with Class F coil insulation, and are rated at 74,400 kVA at 60 C. The limiting temperature rise for the stator Class F insulation is 75º C. A generator heat run test conducted in 1991 indicated that the 80º C field temperature limit is reached at a generator output of 80,000 kVA, while the stator temperature at 80,000 kVA is approximately 50º C. Therefore, the generator output is limited to 80,000 kVA by the existing field windings, although the stator windings have additional capability. Based on the heat run test, the generator can be operated up to the following output levels without exceeding the temperature limits:

kVA	Power Factor	kW
80,000	1.00	80,000
80,000	0.95	76,000
80,000	0.90	72,000

The Yale generators are vertical, recirculating, air-cooled units with single-pass water coolers.

A.2.3.2 Exciter and Automatic Voltage Regulator

The main and pilot exciters and the automatic voltage regulators, manufactured by General Electric, were installed in 1953. They were replaced in 1996 and 1995, respectively, with ABB 325 kW at 250 Vdc Excitation Systems.

These systems have automatic voltage regulators and power system stabilizers. The maintenance schedule for the automatic voltage regulator is the same as that for the exciters.

The non-segregated phase bus duct was manufactured by General Electric and was installed in 1953. It is rated at 3,000 amperes per bus.

The plant is equipped with 2 runs of 3,000-ampere bus duct. The non-segregated phase bus duct is in good condition. A section of bus duct was open during a recent site inspection. The bus duct enclosure was free of debris, and the exposed section of bus duct appeared to be in good condition. This bus duct was upgraded with the new turbine runner to 4,000 amperes.

The original oil-filled generator breakers were replaced in 1992 with new SF6 breakers manufactured by ABB and rated at 4,000 amperes, 13.8 kV. The new breakers are operating satisfactorily.

A.2.3.3 Transmission Line

The Yale Project includes a single 115 kilovolt (kV) primary transmission line that extends 10.5 miles to connect the Yale substation with an interconnected transmission system near the Merwin plant (Figure A.2.3-1).

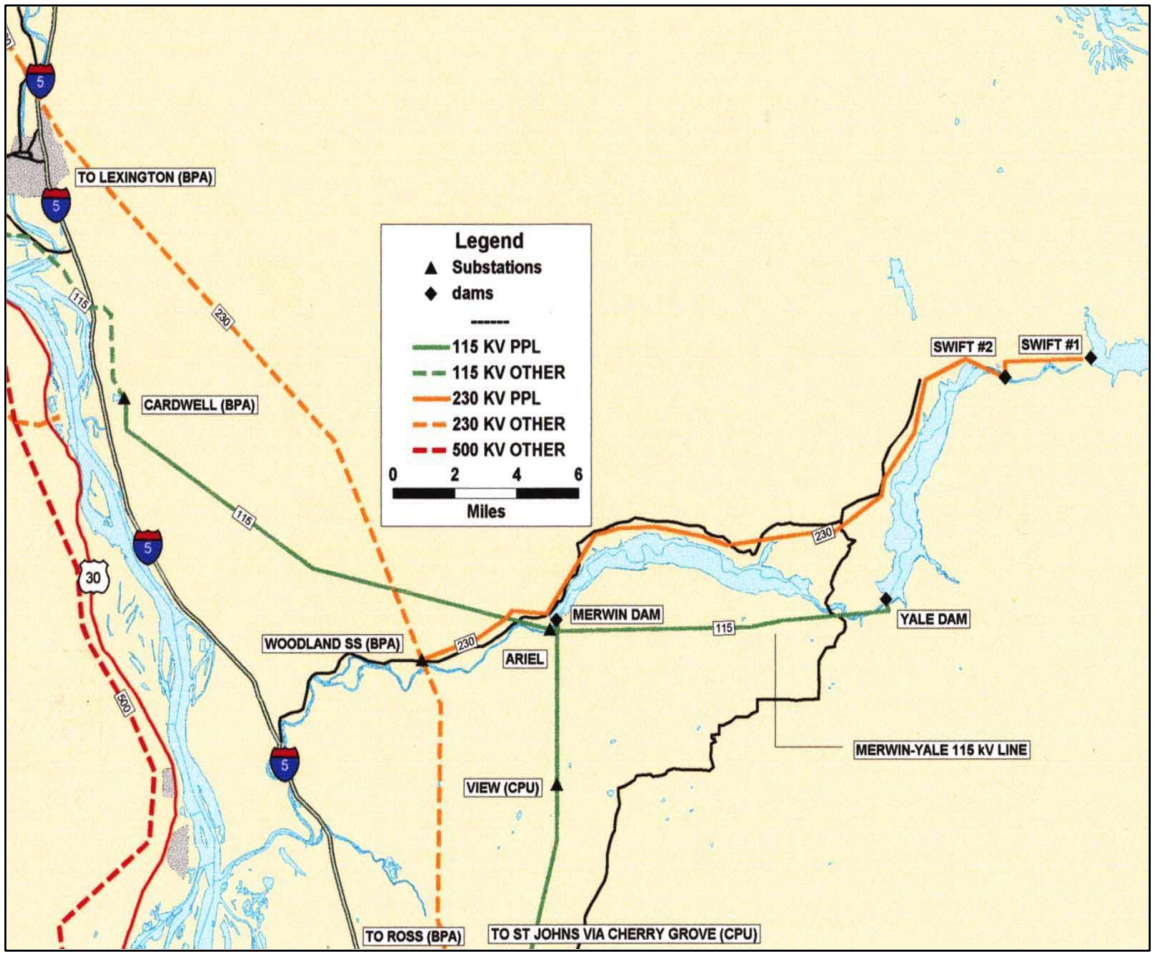

Figure A.2.3-1 Yale Project Transmission Line

A.3.0 Proposed Changes to Project Facilities

~~**PacifiCorp has studied the feasibility of upgrading the existing project auxiliary equipment and systems to improve plant reliability, operation, and safety. Several upgrades have been made since 1995, following completion of the resource utilization study (Black & Veatch 1995). These upgrades are listed in Table C.2.0-2 of Exhibit C. No additional changes to major project facilities which would affect plant output are currently being considered.**~~ **At this time, PacifiCorp is not proposing any major modifications or upgrades. However, the Company will continue to evaluate the potential for project upgrades and modifications as future market and other conditions change to ensure the most cost-effective, efficient and environmentally balanced use of the water resources available.**

A.4.0 Lands of the United States

Federal lands (public lands and reservations of the United States) within the Yale Project boundary total 202.9 acres. Of those acres, 38.7 acres are managed by the Bureau of Land Management (BLM); this includes approximately 2.4 acres that are occupied by Project transmission lines. The

remaining 164.2 acres are lands that are managed by the State of Washington and Clark County, subject to Section 24 of the Federal Power Act. Federal lands are identified as:

- Part of the NW 1/4 of the NE 1/4 of Section 32, Township 6N Range 4E, WM, totaling 38.7 acres (BLM; 2.4 acres of transmission line and 36.3 acres of non-transmission line)
- Part of the NE 1/4 of Section 21, Township 6N Range 4E, WM, totaling 111.8 acres (Clark Co., Section 24)
- Part of the E 1/2 of the SE 1/4 of Section 34, Township 7N Range 4E, WM, totaling 52.4 acres (State of Washington, Section 24)

A.5.0 Literature Cited

~~**Black & Veatch 1995. Resource Utilization Study. Yale Hydroelectric Project (FERC No. P-2071). Prepared for PacifiCorp, Portland, Oregon.**~~

EXHIBIT C – PROJECT INSTALLATION AND PROPOSED SCHEDULE

Yale Hydroelectric Project
(FERC No. P-2071)

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List of Tables

C.1.0 Introduction

This Exhibit C identifies project installation and proposed schedule. Because PacifiCorp seeks a non-capacity amendment and consistent with 18 CFR 4.201(c), only the information impacted by the proposed amendment is included.

C.2.0 Construction History

C.2.1 General Description

The Yale Hydroelectric Project is one of three PacifiCorp projects located on the North Fork of the Lewis River, approximately 28 miles east of Woodland, Washington and 53 miles northeast of Portland, Oregon. The Project site is 34 miles upstream of the confluence of the North Fork Lewis River with the Columbia River. The Yale Project is one of four facilities on the Lewis River. The other three projects are Swift No. 1 (FERC Project No. 2111), Swift No. 2 (FERC Project No. 2213) and Merwin (FERC Project No. 935). The Merwin Hydroelectric Project is located at RM 19.5, the Swift Hydroelectric Project No. 2 is located at RM 44, and the Swift Hydroelectric Project No. 1 is located at RM 47. Swift No. 1, Yale and Merwin are owned and operated by PacifiCorp. Swift No. 2 is owned by the Cowlitz County Public Utility District No 1 (Cowlitz PUD) and maintained and operated by PacifiCorp under contract.

C.2.2 Historical Overview

Investigation of the power production potential of the Lewis River date back to at least 1909 and site explorations were started as early as 1914. Northwestern Electric Company, a predecessor of Pacific Power and Light (PP&L), obtained a preliminary permit from the Federal Power Commission (FPC) to investigate the Yale Project site in 1922. In late 1928, Northwestern Electric Company filed an expanded application for a preliminary permit with the FPC to investigate a comprehensive development of four sites on the Lewis River: Ariel, Basket, Swift and Muddy Creek. Three of the 4 projects have been constructed and are now known as, respectively, Merwin, Yale, and Swift No. 1 and Swift No. 2 (initially proposed as a single project). The fourth project, Muddy, is no longer being considered for development.

C.3.0 Proposed Changes to Project Facilities

As part of this application for license amendment, PacifiCorp will complete the installation of a rock filter / drain berm to the downstream face of the existing Saddle Dam and add a downstream toe drain and centralized drainage swale to monitor any seepage from Saddle Dam. Modifications will extend the toe of the dam approximately 50 feet into the existing recreation site parking lot. The parking lot will be reshaped to maintain pre-project parking capacity. The project will also add maintenance rip rap to the upstream face of the dam. Any ADA features, temporary access or storage sites installed during the construction phase will be removed and or restored to original conditions.

Facility design, permitting and construction are key components of the project each needing the appropriate amount of time to complete. Table C.3.0-1 provides the proposed schedule of development and construction for the Yale Saddle Dam Remediation Project. Given the uncertainty of when the FERC will issue an Order Amending License, the schedule is identified in time after Order issuance.

Table C.3.0-1. Proposed Schedule of Development and Construction of Yale Saddle Dam Remediation Project

Item	**Date**
Design	Complete August 2023
Permitting	Complete September 2023
Procure Contractor	December 2023
Fabrication of rock materials	February 2024
Construction of facility	April 2024 through November 2025
Project Completion/In Service	November 2025

EXHIBIT D – COSTS AND FINANCING

Yale Hydroelectric Project
(FERC No. P-2071)

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D.1.0 Introduction

This Exhibit D is a statement of costs and financing. Because PacifiCorp seeks a non-capacity amendment and consistent with 18 CFR 4.201(c), only the information impacted by the proposed amendment is included. The cost of implementing the project identified in the amendment will not materially affect the value of project power.

D.2.0 Capital and O&M Costs of Proposed Project Modifications and Resource Enhancement Measures (18 CFR 4.51(e)(3)-(4))

The non-capacity amendment seeks approval of activities related to the installation of a rock filter / drain berm to the downstream face of the existing Saddle Dam and add a downstream toe drain and centralized drainage swale to monitor any seepage from Saddle Dam. Modifications will extend the toe of the dam 50 feet into the existing recreation site parking lot. The parking lot will be reshaped to maintain pre-project parking capacity. All ADA features will be rebuilt or retained. The project will also add maintenance rip rap to the upstream face of the dam.

Implementation will require project modifications. Detailed information regarding these project modifications are included in Exhibits E, F and R.

The estimated capital and O&M cost of all Yale Hydroelectric Project license non-power resource enhancements for the upcoming 36-year period is $223,793,000.

D.3.0 Annual Costs of the Project

The estimated levelized annual cost of operating the Yale Hydroelectric Project including completion of the proposed project is presented in Table D.3.0-1.

Table D.3.0-1. Estimated Annual Cost of Yale Future Project Operations over a 36-year Period.

Description	Levelized Annual Cost (in thousands)*
CONTINUING OPERATIONS	
Sunk Costs	
Net Investment of $53 M	
Cost of Capital	$2,025
Income and Property Taxes	652
Depreciation and Amortization	1,355
Total Fixed Cost	$4,032
Capital	
Planned Investment of $556 M	
Cost of Capital	$10,298
Income and Property Taxes	3,877
Depreciation and Amortization	9,388
Total Fixed Cost	$23,563

Description	Levelized Annual Cost (in thousands)*
O&M	
Operations and Maintenance of $146 M	$3,515
Subtotal	$31,110
IMPLEMENTATION COSTS	
Capital	
Planned Investment of $225 M	
Cost of Capital	$4,886
Income and Property Taxes	1,841
Depreciation and Amortization	4,098
Total Fixed Cost	$10,825
Lost Generation During Construction/Yr.	$0
Operations and Maintenance of $63 M	$1,506
Subtotal	$12,331
TOTAL	**$43,441**

* Based on a 36-year analysis with inflation

D.4.0 Sources and Extent of Financing and Annual Revenues

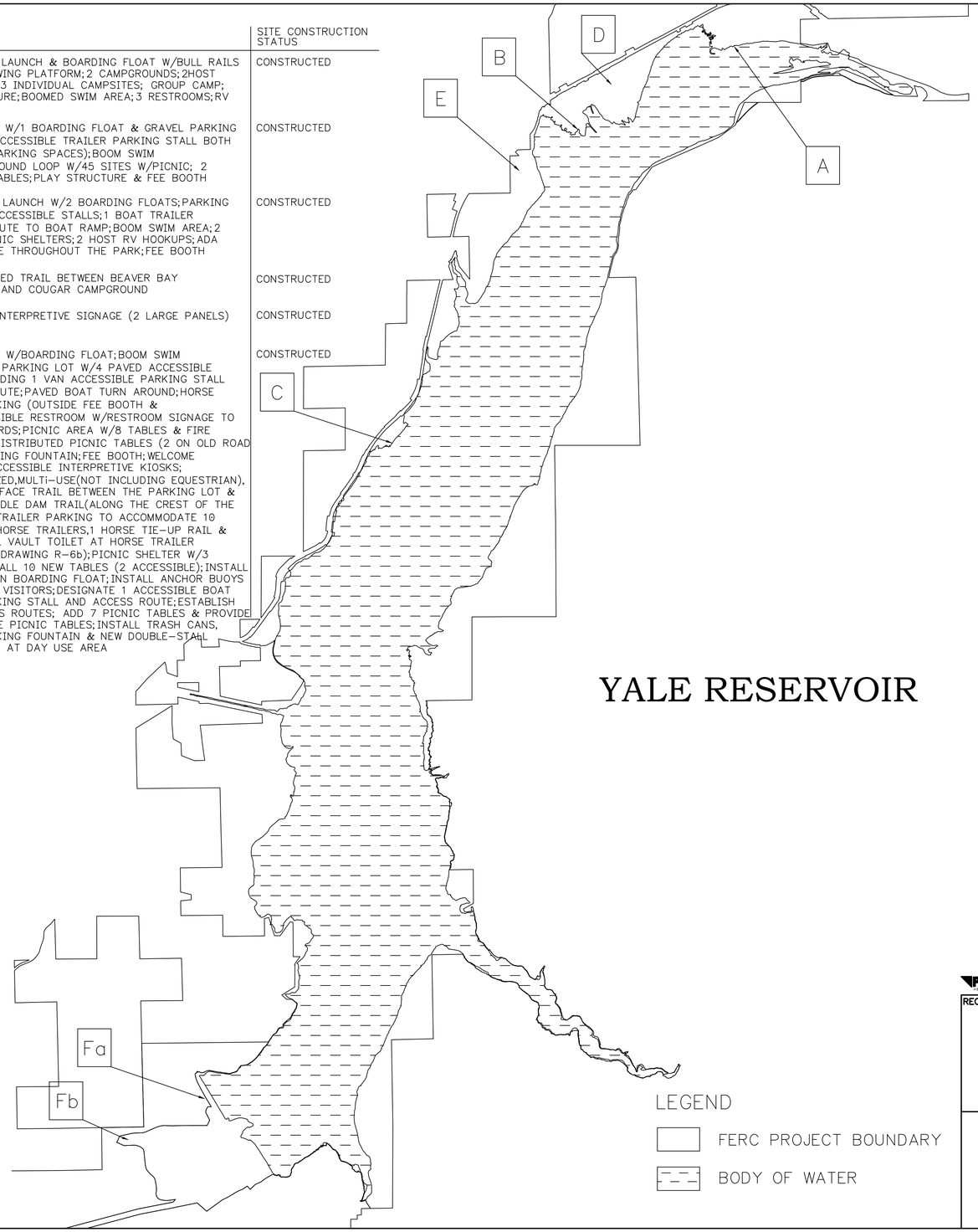
PacifiCorp has the resources for financing and sufficient annual revenues to provide for the current capital needs associated with the continued operation of the Yale Hydroelectric Project and those needs associated with the license amendment. If additional financing is necessary, the capital will be financed using the company's traditional sources of debt and common equity.

Annual financial information is provided in PacifiCorp's annual report to shareholders and in FERC Form 1.

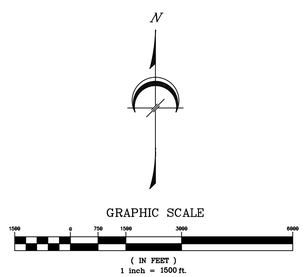
EXHIBIT R – RECREATION FACILITY DRAWINGS

Yale Hydroelectric Project
(FERC No. P-2071)

IDENTIFICATION SITE	DRAWING NUMBER	RECREATION SITE NAME	RECREATION FACILITIES	SITE CONSTRUCTION STATUS
A	R-1	BEAVER BAY CAMPGROUND	1 LANE BOAT LAUNCH & BOARDING FLOAT W/BULL RAILS WETLAND VIEWING PLATFORM; 2 CAMPGROUNDS; 2HOST CAMP SITES; 63 INDIVIDUAL CAMPSITES; GROUP CAMP; PLAY STRUCTURE; BOOMED SWIM AREA; 3 RESTROOMS; RV DUMP	CONSTRUCTED
B	R-2	COUGAR PARK & CAMPGROUND	BOAT LAUNCH W/1 BOARDING FLOAT & GRAVEL PARKING LOT (1 ADA ACCESSIBLE TRAILER PARKING STALL BOTH ARE PAVED PARKING SPACES); BOOM SWIM AREA; CAMPGROUND LOOP W/45 SITES W/PICNIC; 2 RESTROOMS; TABLES; PLAY STRUCTURE & FEE BOOTH	CONSTRUCTED
C	R-3	YALE PARK	4 LANE BOAT LAUNCH W/2 BOARDING FLOATS; PARKING W/2 PAVED ACCESSIBLE STALLS; 1 BOAT TRAILER W/ACCESS ROUTE TO BOAT RAMP; BOOM SWIM AREA; 2 DAY USE PICNIC SHELTERS; 2 HOST RV HOOKUPS; ADA ACCESS ROUTE THROUGHOUT THE PARK; FEE BOOTH	CONSTRUCTED
D	R-4	BEAVER BAY TRAIL	NON-MOTORIZED TRAIL BETWEEN BEAVER BAY CAMPGROUND AND COUGAR CAMPGROUND	CONSTRUCTED
E	R-5	YALE VISITOR INFORMATION FACILITY	KIOSK WITH INTERPRETIVE SIGNAGE (2 LARGE PANELS)	CONSTRUCTED
F	R-6a & R-6b	SADDLE DAM PARK & SADDLE DAM EQUESTRIAN PARK	BOAT LAUNCH W/BOARDING FLOAT; BOOM SWIM AREA; GRAVEL PARKING LOT W/4 PAVED ACCESSIBLE STALLS INCLUDING 1 VAN ACCESSIBLE PARKING STALL W/ACCESS ROUTE; PAVED BOAT TURN AROUND; HORSE TRAILER PARKING (OUTSIDE FEE BOOTH & GATE); ACCESSIBLE RESTROOM W/RESTROOM SIGNAGE TO ANSI STANDARDS; PICNIC AREA W/8 TABLES & FIRE PITS; OTHER DISTRIBUTED PICNIC TABLES (2 ON OLD ROAD GRADE); DRINKING FOUNTAIN; FEE BOOTH; WELCOME KIOSK; ADA ACCESSIBLE INTERPRETIVE KIOSKS; NON-MOTORIZED, MULTI-USE (NOT INCLUDING EQUESTRIAN), NATURAL SURFACE TRAIL BETWEEN THE PARKING LOT & EXISTING SADDLE DAM TRAIL (ALONG THE CREST OF THE DAM); HORSE TRAILER PARKING TO ACCOMMODATE 10 VEHICLES W/HORSE TRAILERS, 1 HORSE TIE-UP RAIL & SINGLE-STALL VAULT TOILET AT HORSE TRAILER PARKING (SEE DRAWING R-6b); PICNIC SHELTER W/3 TABLES; INSTALL 10 NEW TABLES (2 ACCESSIBLE); INSTALL BULL RAILS ON BOARDING FLOAT; INSTALL ANCHOR BUOYS FOR BOAT IN VISITORS; DESIGNATE 1 ACCESSIBLE BOAT TRAILER PARKING STALL AND ACCESS ROUTE; ESTABLISH OTHER ACCESS ROUTES; ADD 7 PICNIC TABLES & PROVIDE BARRIER-FREE PICNIC TABLES; INSTALL TRASH CANS, GRILLS, DRINKING FOUNTAIN & NEW DOUBLE-STALL VAULT TOILET AT DAY USE AREA	CONSTRUCTED



YALE RESERVOIR



LEGEND

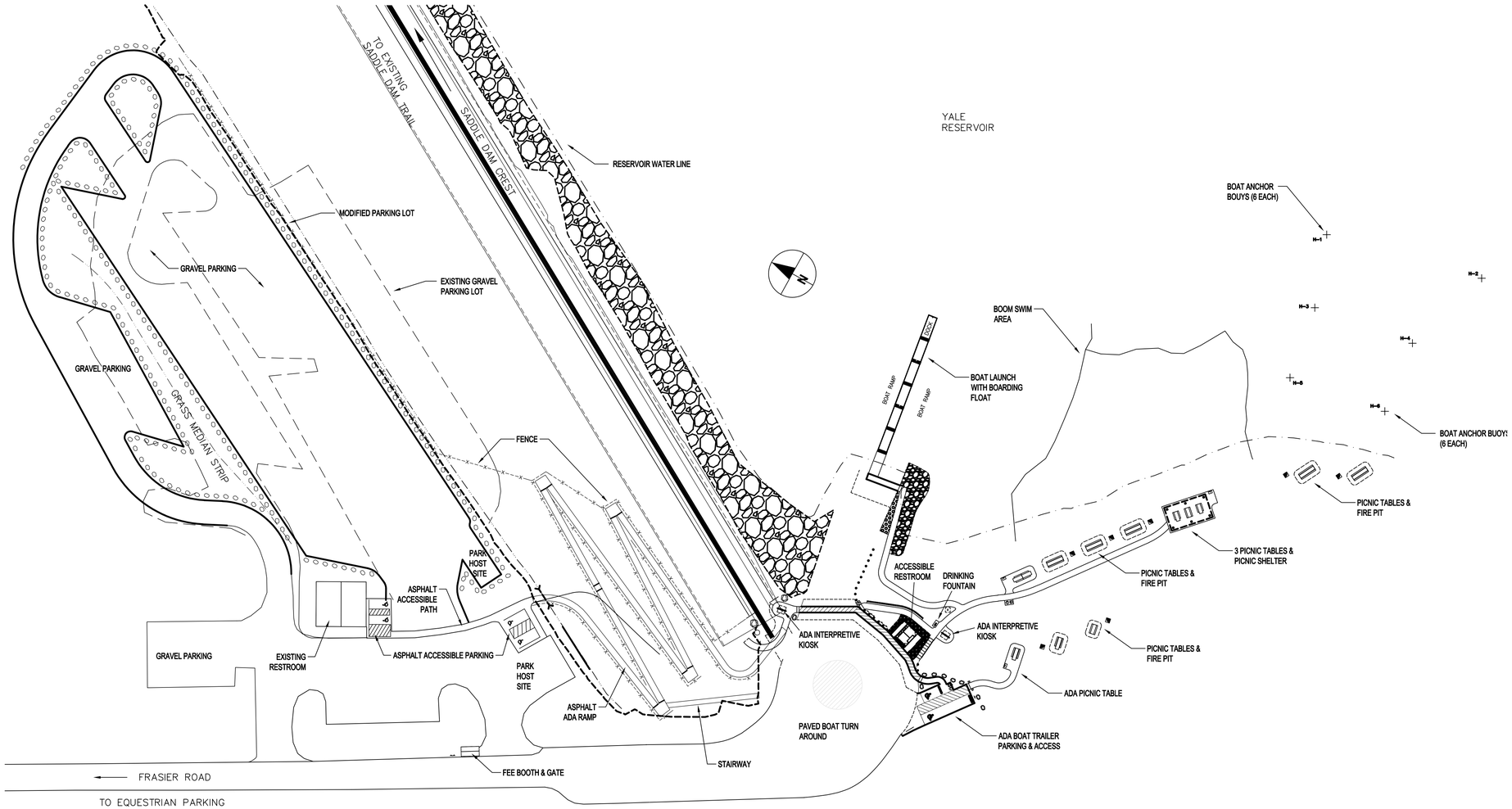
- FERC PROJECT BOUNDARY
- BODY OF WATER

PACIFICORP

RECREATION R REV. 0

YALE HYDROELECTRIC PROJECT FERC NO. P-2071
ASBUILT SITE PLAN OF RECREATION FACILITIES
YALE RESERVOIR
BEAVER BAY CAMPGROUND, COUGAR PARK &
CAMPGROUND, YALE PARK & SADDLE DAM PARK

COVER PAGE



RECREATION SITE NAME	RECREATION FACILITIES	SITE CONSTRUCTION STATUS
SADDLE DAM PARK	BOAT LAUNCH W/BOARDING FLOAT W/BULL RAILS;BOOMED SWIM AREA;GRAVEL PARKING LOT W/4 PAVED ACCESSIBLE STALLS INCLUDING 1 VAN ACCESSIBLE PARKING STALL W/ACCESS ROUTE;PAVED BOAT TURN AROUND;HORSE TRAILER PARKING (SEE DRAWING R-6b) (OUTSIDE FEE BOOTH & GATE);ACCESSIBLE RESTROOM W/RESTROOM SIGNAGE TO ANSI STANDARDS;PICNIC AREA W/15 TABLES (2 ACCESSIBLE) & FIRE PITS;OTHER DISTRIBUTED PICNIC TABLES (2 ON OLD ROAD GRADE);DRINKING FOUNTAIN;FEE BOOTH;WELCOME KIOSK;ADA ACCESSIBLE INTERPRETIVE KIOSKS; NON-MOTORIZED,MULTI-USE(NOT INCLUDING EQUESTRIAN), NATURAL SURFACE TRAIL BETWEEN THE PARKING LOT & EXISTING SADDLE DAM TRAIL(ALONG THE CREST OF THE DAM); PICNIC SHELTER W/3 TABLES;ANCHOR BUOYS FOR BOAT IN VISITORS; 1 ACCESSIBLE BOAT TRAILER STALL W/ACCESS ROUTE AND DOUBLE-STALL VAULT TOILET AT DAY USE AREA	CONSTRUCTED

PACIFICORP
A BHE COMPANY

RECREATION R-13b REV. 0

YALE HYDROELECTRIC PROJECT FERC NO. P-2071
ASBUILT SITE PLAN OF RECREATION FACILITIES
SADDLE DAM PARK

40' 0 40' 80'
SCALE IN FEET

Yale Hydroelectric Project
FERC Project No. P-2071

Before the
United States of America
Federal Energy Regulatory Commission

Draft Application for License Amendment

Volume II of IV
Exhibit E

PACIFICORP
A BERKSHIRE HATHAWAY ENERGY COMPANY

December 2022

EXHIBIT E – ENVIRONMENTAL REPORT

Yale Hydroelectric Project
(FERC No. P-2071)

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List of Figures (see Attachment A)

List of Acronyms and Abbreviations

ACHP	Advisory Council on Historic Preservation
ADA	Americans with Disabilities Act
amsl	above mean sea level
BMP	best management practice
CEQ	Council on Environmental Quality
cfs	cubic feet per second
CFR	Code of Federal Regulations
CCC	Cowlitz County Code
CWA	Clean Water Act
DAHP	Washington Department of Archaeology and Historic Preservation
Ecology	Washington State Department of Ecology
EFH	Essential Fish Habitat
ESA	Endangered Species Act
FERC	Federal Energy Regulatory Commission
H	horizontal
HPMP	Historic Properties Management Plan
IWWPP	in-water work protection plan
JARPA	Joint Aquatic Resources Permit Application
MSA	Magnuson-Stevens Fishery Conservation Management Act
National Register	National Register of Historic Places
NMFS	National Marine Fisheries Service
NHPA	National Historic Preservation Act
NTU	nephelometric turbidity unit
OHWL	ordinary high water line
PA	Programmatic Agreement
Program	Columbia River Basin Fish and Wildlife Program
RCW	Revised Code of Washington
RRMP	Recreation Resource Management Plan
SEPA	State Environmental Policy Act
SMP	Shoreline Management Program
SPCCP	Spill Prevention, Control, and Countermeasure Plan
SSDP	Shoreline Substantial Development Permit

TCC	Terrestrial Coordination Committee
TESC	Temporary Erosion and Sediment Control
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
V	vertical
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WHMP	Wildlife Habitat Management Plan
WRIA	Water Resource Inventory Area

1.0 Application

Application Type:	Non-Capacity Amendment of License
Date Filed:	TBD 2022
Licensee's Name:	PacifiCorp
Water Body:	Yale Reservoir
Nearest Town:	Chelatchie
County and State:	Cowlitz County, Washington
Federal Lands:	No construction, staging, or access would occur on or through federal lands.

2.0 Purpose and Need

2.1 Background

Yale Saddle Dam was constructed in 1952. Several geotechnical investigations have since been conducted to evaluate potential project expansion, filter compatibility, and liquefaction potential. The most recent investigations and analyses, conducted in 2020 and 2021, identified seismic stability concerns with the dam embankment involving the potential for liquefaction of foundation materials. These investigations identified a need to address seismic deficiencies and informed the design of modifications or enhancements to the foundation or embankment to address these deficiencies.

The Yale Hydroelectric Project (Yale Project) is licensed by the Federal Energy Regulatory Commission (FERC) (Project No. 2071). The Yale Project is one component of the larger Lewis River Hydroelectric Development. The initial FERC license for the Yale Project was issued on April 30, 1951, and expired on April 30, 2001. The current license was issued under an Order Issuing New License on June 26, 2008, and expires May 31, 2058. Given the extent of seismic remediation construction to Yale Saddle Dam and the impact of such to other resources, PacifiCorp is seeking an amendment of the project license.

2.2 Amendment Application

In compliance with 18 Code of Federal Regulations (CFR) Part 4, Subpart L, PacifiCorp is applying to FERC for a non-capacity amendment to the license for the Yale Project. Prior to submission of this application, PacifiCorp distributed a draft application to parties of the Lewis River Settlement Agreement for 90-day review and comment.

The draft application for license amendment was distributed to the following Tribes, resource agencies, and nongovernmental organizations for a 90-day comment period on XXX, 2022. Comments were due to PacifiCorp on XXX, 2022 (see 18 CFR § 4.38(a)(7)).

1. American Rivers
2. City of Woodland
3. Clark County
4. Confederated Tribes and Bands of the Yakama Nation*
5. Cowlitz County
6. Cowlitz Indian Tribe*
7. Cowlitz-Skamania Fire District No. 7
8. Fish First
9. Lewis River Aquatic Coordination Committee Representatives
10. Lewis River Citizens at-Large
11. Lewis River Community Council
12. National Marine Fisheries Service*
13. National Park Service
14. North Country Emergency Medical Service
15. Public Utility District No. 1 of Cowlitz County, Washington
16. Rocky Mountain Elk Foundation, Inc.
17. Skamania County
18. The Lower Columbia Fish Recovery Board
19. The Native Fish Society
20. Trout Unlimited
21. United States Department of Agriculture Forest Service*
22. United States Bureau of Land Management
23. United States Fish and Wildlife Service*
24. Washington Department of Ecology*
25. Washington Department of Fish and Wildlife*
26. Washington State Recreation and Conservation Office, formerly known as Washington Interagency Committee for Outdoor Recreation
27. Woodland Chamber of Commerce

* Denotes consultation party for purposes of 18 CFR § 4.38(a)(7).

Comments received in response to the draft application are summarized in the Response to Comments Table provided in Appendices to Exhibit E of this license amendment application. Individual comment letters are also included in the appendix.

A list of the name and address of every federal, state, and interstate resource agency, tribe, and member of the public with which PacifiCorp consulted in preparation of Exhibit E is also included in Appendices to Exhibit E.

2.3 Project Purpose

The purpose of the Yale Saddle Dam Seismic Remediation Project (proposed action) is to implement seismic remediation measures that improve the seismic performance of the dam based on the results of seismic stability evaluations presented in the *Yale Saddle Dam Existing Conditions Geotechnical Analyses Report* (AECOM 2022a). To determine the environmental effects and identify potential environmental measures that may be needed as a result of the proposed action, FERC staff will prepare an Environmental Assessment, which describes and evaluates probable environmental effects of the licensee's proposed action and a no-action alternative. The Environmental Assessment will provide a basis for FERC's action on the licensee's application for non-capacity amendment of license. This environmental report (Exhibit E of the Application for a Non-Capacity Related Amendment of License) will support FERC's Environmental Assessment.

3.0 Yale Hydroelectric Project Description and Operation

3.1 Overall Yale Hydroelectric Project Description

Components of the Yale Project include the reservoir (Yale Reservoir), the main embankment dam (Yale Dam), an earth-fill saddle dam (Yale Saddle Dam), power intake and tunnel, gated five-bay spillway, a powerhouse with two vertical turbine generator units with a combined capacity of 134 megawatts, and the 115-kilovolt Merwin-Yale transmission line.

The Yale Project is one of four hydroelectric projects located on the North Fork Lewis River, which also include the Merwin Project, the Swift No. 2 Project, and the Swift No. 1 Project. The Yale Project is located at the upstream end of Lake Merwin at river mile 34. The Yale Dam embankment is on the original Lewis River channel. Yale Saddle Dam is approximately 0.25 mile north of the Yale Dam on the north bank and contributes to the impoundment of Yale Reservoir.

The Yale Project boundary includes all shoreline recreational sites (Yale Park, Saddle Dam Park, Cougar Campground, Beaver Bay Campground); a narrow shoreline buffer around the reservoir; all project development facilities (dams and powerhouse); the Speelyai diversion and canal; and the Merwin-Yale transmission line, which extends 10.5 miles from the Yale powerhouse to a substation near the Merwin Project.

The Yale Project boundary is shown in Figure 3-1.

3.2 Yale Hydroelectric Project Operation

The Yale Project typically operates as a peaking resource and provides grid stability balancing intermittent generation sources such as wind or solar. Typically, the Yale Project generates on demand throughout the day and is off-line (not generating) at night. Although the full powerhouse capacity is 9,640 cubic feet per second (cfs), median monthly releases range from a peak of 6,500 cfs in December to a low of 1,300 cfs in August, with releases dropping to zero when off-line (FERC 2006).

3.3 Yale Reservoir and Yale Saddle Dam

Yale Reservoir is an in-stream reservoir created by the Yale Dam and Yale Saddle Dam. Primary inflow to the reservoir is from the Swift No. 2 powerhouse and Swift No. 2 ungated spillway, with additional flow contributions from Swift No. 1 spillway releases, Upper Speelyai Creek, Cougar Creek, Rain and Ole Creeks, and Siouxon Creek (FERC 2006).

The reservoir is approximately 10.5 miles long and has an approximate surface area of 3,800 acres, with a normal maximum operating elevation of 490 feet above mean sea level (amsl). The reservoir's gross storage capacity at this elevation is 402,000 acre-feet, with a usable storage capacity of 190,000 acre-feet. The drainage area for the reservoir is 596 square miles. Water levels are normally maintained between 480 and 490 feet amsl in summer for recreation uses, averaging 487 feet amsl, although daily fluctuations are generally less than 1 foot. Winter/spring elevations are relatively stable, with median monthly values averaging 475 feet amsl (FERC 2006; PacifiCorp 2020a). Given the current seismic concerns of Yale Saddle Dam, PacifiCorp is currently operating Yale Reservoir at a target maximum reservoir elevation of 480 feet amsl (10 feet below normal operating levels).

Yale Saddle Dam is approximately 2,000 feet long and has a maximum height of 37 feet, a 30-foot-wide crest, and 3 horizontal (H):1 vertical (V) side slopes. The dam crest is at an elevation of 503 feet amsl. The upstream slope is protected from erosion by a 2-to-3-foot layer of riprap, while the downstream slope has a grass surface.

4.0 Proposed Action and No-Action Alternatives

4.1 Licensee's Proposed Action

4.1.1 General Description of Proposed Action

The proposed seismic remediation project involves modifying the existing Yale Saddle Dam to address stability concerns identified in the recent seismic performance evaluations (AECOM 2022a). Figure 4-1 provides a general overview of the proposed action.

4.1.2 Modifications to Appurtenant Project Facilities

The existing dam is a zoned earthfill embankment that consists of an upstream and downstream shell surrounding a low permeability core. The dam embankment was not designed or constructed with an engineered filter and has been shown to be potentially susceptible to cracking during a seismic event. If a transverse crack extended through the dam below the operating water line, an uncontrolled release of the reservoir and dam failure could occur from erosion through the seismically induced crack. The proposed modifications to the dam include the following:

- A filter and drain berm constructed on the downstream face of the dam intended to protect the embankment should seismically induced cracking occur
- A shallow drainage collection ditch at the downstream dam toe intended to collect any seepage or infiltration into the filter drain system and discharging to a central drainage swale

- Riprap placement on the upstream side of the dam to augment existing riprap and provide continuing protection against erosion from wave run-up
- Modifications to Saddle Dam Park recreational facilities to relocate existing facilities and in accordance with FERC license criteria due to new toe of the embankment extending over the existing facilities footprint

4.1.2.1 Filter and Drain Berm and Drainage Swale

The filter and drain berm on the downstream face of the dam would consist of a two-stage chimney (sloped near-vertical section) and blanket (horizontal section) filter and drain overlain by rockfill cover material. The filter and drain berm would be installed on the existing 3H:1V downstream slope (following topsoil stripping), with a final grade downstream slope of 3.5H:1V. The new dam toe created by the filter and drain berm would extend to a point approximately 45 feet from the existing embankment toe. A toe ditch along the new downstream toe would collect and route seepage from the filter and drain berm to a central drainage swale connected to the toe ditch at the lowest point along the new downstream dam toe and extending downstream. Seepage analyses of the embankment's existing conditions and the modified dam cross section suggest that perennial seepage through the embankment and foundation would not be intercepted by the new filter drain system. The filter drain system is designed to filter piping as a result of a seismically induced crack within the embankment and safely discharge seepage collected downstream and away from the dam by means of the toe ditch and central drainage swale. Incidental infiltration from precipitation travelling through the rockfill embankment material would also be collected by the drainage system and be conveyed downstream and away from the dam by means of the toe ditch and central drainage swale.

The central drainage swale would be sloped at a 1 percent grade to convey drainage downstream and away from the dam embankment. The central drainage swale would include riprap armament where the toe ditch from each side of the embankment discharges into it. The swale would be finished downstream with topsoil and seeded to create a grassy swale. The central drainage swale would be shaped as a trapezoid with an 8-foot bottom dimension and 3H:1V side slopes to facilitate mowing. The grassy swale would discharge to the surface at a daylight point downstream in Saddle Dam Park.

4.1.2.2 Riprap Placement on Upstream Side of Dam

Riprap would be added to the upstream side of the dam from the toe of the embankment to near the crest. The new riprap would be blended with existing riprap materials to reestablish a nominal thickness of 2 feet, as originally designed and constructed. The riprap provides armoring to prevent erosion from wave run-up on the upstream slope of the dam. The reservoir would be temporarily drawn down during the winter months for a 2-week duration and to an elevation of 465 feet amsl to allow access for riprap placement (see Section 4.1.3.4).

4.1.2.3 Modifications to Recreational Facilities

The new filter and drain berm would extend the toe of the dam downstream and therefore occupy a portion of the existing downstream Saddle Dam recreation site parking lot. The gravel parking lot would be expanded and reconfigured to create a new parking lot approximately the same size

as the existing lot. The reconfigured parking lot would include relocated grass vegetated islands and a relocated drainage swale similar to the existing features. Three existing park host sites would be relocated. No modifications to recreational facilities on the upstream side of the dam are planned; they would be protected in place or be replaced in-kind if necessary to accommodate construction.

Two septic tanks would be abandoned in place and replaced with new septic tanks in a new location. The existing septic tanks are associated with a septic cleanout station and discharge to a nearby leach field. The septic tanks to be abandoned would be pumped out and filled with concrete, and the leach field would be abandoned in place. The new septic system (septic tanks and leach field) for a new septic cleanout station would be installed in a suitable location that considers the expanded parking lot footprint.

The existing asphalt accessible parking lot near the park restroom, the asphalt Americans with Disabilities Act (ADA)-accessible parking ramp and fence, and the concrete stairs and handrails extending from the parking lot on the downstream side of the dam would be demolished and reconstructed in-kind on the extended embankment.

4.1.3 Construction Activities

4.1.3.1 Access, Parking, Laydown Areas, and Equipment

Access to the construction site on the downstream side of the dam would be from Frasier Road via the 1000 Road and existing park entrance (Figure 4-2). Planned on-site temporary construction access roads would include a 24-foot-wide primary access road extending from the 1000 Road through the laydown areas, a 12-foot-wide secondary access road along the north side of the central drainage swale, and temporary ramps to access the dam from the north and south ends of the filter and drain berm. The temporary construction access roads would be lined with geotextile and 12 inches of aggregate base course.

Access to the upstream side of the dam for riprap rehabilitation would be via the existing boat ramp and along the upstream dam toe via a new layer of riprap bedding.

Existing parking areas along Frasier Road would be used for construction trailers and vehicle parking. The construction site would include four laydown areas on the downstream side of the dam, totaling approximately 14 acres (Figure 4-2). Similar to the temporary construction access roads, laydown areas would be lined with geotextile and 12 inches of aggregate base course. Laydown areas would be located more than 20 feet from the dripline of trees not designated for removal.

Construction equipment is expected to include conventional earth-moving equipment such as haul trucks, roller compactors, motor graders, front-end loaders, and excavators.

4.1.3.2 Construction Preparation

Preparatory work for construction would include installing construction fencing, implementing erosion and sediment controls, and establishing access roads and staging and stockpile areas. Demolition and site preparation activities would include removing existing recreational facilities, including the ADA ramp and fences.

The downstream portion of the dam, abutments, and central drainage swale would be cleared and grubbed of vegetation. An estimated 140 to 150 trees would be removed for the dam remediation project. Figure 4-3 shows the proposed tree removal areas. All tree removal would be mitigated for as described in Section 6.2.5.2.3.

4.1.3.3 Filter and Drain Berm, and Drainage Swale Installation

Construction of the dam modifications and central drainage swale would begin with stripping topsoil and excavating the existing dam embankment, downstream foundation area, and central drainage swale. Excavation would be followed by placing the filter sand, drain gravel, and rockfill cover materials, placing riprap in the upstream end of the central drainage swale, and placing topsoil in the remaining length of the central drainage swale.

The sand filter, drain gravel, and rockfill materials would be imported from an off-site commercial source and would either be stockpiled on-site or transported directly to the embankment and placed. The fill materials would be placed and compacted concurrently in horizontal lifts from the foundation to the dam crest. Figure 4-4 and Figure 4-5 show the proposed dam excavation plan and proposed filter and drain berm plan and section, respectively.

4.1.3.4 Reservoir Drawdown and Riprap Rehabilitation

Upstream riprap rehabilitation would consist of placing the riprap bedding layer along the toe of the embankment, followed by placing new riprap to amend the existing riprap and to cover areas of the upstream embankment slope without riprap protection. The riprap rehabilitation work would occur in four primary phases: reservoir drawdown, installation of erosion and sediment control, placement of riprap, and return of water level to normal operating pool elevations.

Phase 1 would involve drawing down the water level in the reservoir from the current maximum target water level of 480 feet amsl to an elevation of approximately 465 feet amsl.

When water levels in the reservoir reach the target elevations and water has drained from the construction work area, Phase 2 would begin with installation of temporary erosion and sediment control (TESC) measures around the construction work area to prevent the transport of sediments to adjacent in-water areas.

Access to the upstream side of the dam for Phase 3 of the riprap rehabilitation work would be via the existing boat ramp adjacent to the left abutment of the dam and along the upstream toe of the dam via a new layer of riprap bedding. The bedding would be placed 10 feet wide along the toe of the riprap rehabilitation area. The new bedding layer would form a base for placement of new riprap and large boulders removed from existing riprap. Riprap would be placed from the toe of the embankment to near the crest to create a minimum total 2-foot layer including existing riprap.

The new riprap would be blended to create a smooth transition to the existing rehabilitated riprap area on the north bank of the dam.

4.1.3.5 Construction Schedule

Construction would occur over a period of approximately 18 months after receipt of regulatory approvals. Assuming approvals are received in the last quarter of 2023, construction would commence in the first quarter of 2024, and conclude in the summer of 2025. The reservoir drawdown for riprap work is anticipated to occur during the winter, in December and/or January. This schedule may be modified depending on when all required regulatory approvals are actually received.

4.1.4 Site Reclamation

Site reclamation would include removing temporary geotextile and road base course from construction access roads and laydown areas, discing the underlying topsoil and/or placing stockpiled topsoil, hydroseeding, and final cleanup. Equipment would be demobilized following completion of construction. The equestrian trail where it crosses the right abutment of the dam (Figure 4-1) would be restored following project completion.

4.2 No-Action Alternative

Under the no-action alternative, FERC would not approve the non-capacity license amendment to construct the proposed seismic remediation project. No physical modification to Yale Saddle Dam would occur, and there would be no associated modifications to Saddle Dam Park. The project would continue to operate under the terms and conditions of the existing license, and no new environmental protection, mitigation, or enhancement measures would be implemented. The Yale Saddle Dam would not be modified in a manner to improve its seismic stability consistent with purpose and need. However, the no-action alternative assumes that FERC would continue to require PacifiCorp to operate Yale Reservoir at a reduced maximum operating elevation of 480 feet amsl.

5.0 Agency Consultation and Compliance

5.1 Licensee's Pre-Filing Consultation

PacifiCorp has informed and consulted with representatives of the Lewis River Terrestrial Coordination Committee (TCC) and Recreation Advisory Committee in preparing this application for FERC license amendment and has provided a draft application to parties of the Lewis River Settlement Agreement for a 90-day review and comment consistent with Section 15.3.2 of the Settlement Agreement and applicable FERC regulations. Comments received on the draft application and PacifiCorp responses to comments are included in the Consultation Record (see Appendix X).

FERC has designated PacifiCorp as its non-federal representative for Endangered Species Act (ESA) Section 7 consultation and National Historic Preservation Act (NHPA) Section 106

consultation. Accordingly, PacifiCorp has initiated consultation with the National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife Service (USFWS), and Washington Department of Archaeology and Historic Preservation (DAHP). These consultations are ongoing.

PacifiCorp has initiated, or plans to initiate, consultation with the agencies identified in Table 5-1 to acquire the necessary requirements, permits, or approvals for the proposed action.

Table 5-1 Resource Agency Review Required by the Licensee

Resource Agency	Requirements, Permits, or Approvals
U.S. Army Corps of Engineers	Section 404 of Clean Water Act, Nationwide Permit 31, Maintenance of Existing Flood Control Facilities *(Application submitted April 27, 2022)*
Washington State Department of Ecology	In-Water Work Protection Plan Approval per Clean Water Act Permit No. 3677 *(pending)*
National Marine Fisheries Service	Endangered Species Act, Section 7 Consultation *(pending)* Magnuson-Stevens Fishery Conservation and Management Act, Section 305b Essential Fish Habitat Consultation *(pending)*
U.S. Fish and Wildlife Service	Endangered Species Act, Section 7 Consultation *(pending)*
Washington State Department of Archaeology and Historic Preservation	National Historic Preservation Act, Section 106 Consultation *(pending)*
Washington Department of Fish and Wildlife	Hydraulic Project Approval *(pending)*
Cowlitz County	Shoreline Substantial Development Permit and Critical Areas Permit *(Application submitted April 27, 2022)* Washington State Environmental Policy Act Review/Determination *(Submitted as part of Shoreline Substantial Development Permit application)*

5.2 Statutory and Regulatory Compliance

5.2.1 Cowlitz County

5.2.1.1 Shoreline Management Program

Yale Reservoir is designated a Shoreline of Statewide Significance under the Shoreline Management Act of 1971. Within Cowlitz County, Yale Reservoir and all areas within 200 feet of the ordinary high water mark of Yale Reservoir are under the jurisdiction of the Cowlitz County Shoreline Management Program (SMP). Such areas include floodways and contiguous floodplain areas 200 feet landward from such floodways, and associated wetlands.

Under the Cowlitz County SMP, a Shoreline Substantial Development Permit (SSDP) is required for projects within 200 feet of the ordinary high water mark and/or within the 100-year floodplain of state-designated shorelines. PacifiCorp submitted an SSDP for the proposed action to Cowlitz County on April 27, 2022.

5.2.1.2 Critical Areas

Cowlitz County requires a "critical areas report" for proposed development activities in or adjacent to critical areas or associated buffers (Cowlitz County Code [CCC] Chapter 19.15.090).

PacifiCorp prepared and submitted (on April 27, 2022) a Wetland Delineation and Critical Areas Assessment Report to meet Cowlitz County critical areas assessment and reporting requirements in accordance with CCC Chapter 19.15 (Critical Areas), including the Level II Habitat Assessment requirements contained in CCC 19.15.130.C.30. Critical areas addressed in the report include wetlands, fish and wildlife habitat conservation areas (including streams, and shorelines subject to the Cowlitz County SMP), frequently flooded areas, geologically hazardous areas, and critical aquifer recharge areas.

5.2.1.3 Washington State Environmental Policy Act

Consistent with the requirement of Washington's State Environmental Policy Act (SEPA), a SEPA Checklist was prepared and submitted on April 27, 2022 to Cowlitz County, which is the SEPA local lead agency.

5.2.2 Washington Department of Fish and Wildlife, Hydraulic Project Approval

The Washington Department of Fish and Wildlife (WDFW) requires a Hydraulic Project Approval for projects that use, divert, obstruct, or change the natural flow or bed of any of the salt or fresh waters of the state (Washington Administrative Code [WAC] 220.660.010). PacifiCorp will submit a Hydraulic Project Approval application for the proposed action.

5.2.3 U.S. Army Corps of Engineers, Section 404 Nationwide Permit

Section 404 of the Clean Water Act (CWA) requires that anyone intending to deposit or discharge dredged or fill material into navigable waters of the United States, including wetlands, must first receive authorization for such activities. Such discharges include return water from dredged material disposed on upland property and generally any fill material like rock, sand, or dirt. The U.S. Army Corps of Engineers (USACE) is responsible for administering the Section 404 permitting process. Activities in wetlands for which permits may be required include, but are not limited to, placement of fill material, ditching activities when the excavated material is side-cast, levee and dike construction, mechanized land clearing, land leveling, road construction, and dam construction.

When issuing a permit, the USACE will require consultation under ESA Section 7, Essential Fish Habitat (EFH) consultation under the Magnuson-Stevens Fishery Conservation Management Act (MSA), and consultation under NHPA Section 106. As FERC's non-federal representative for these consultations, PacifiCorp will coordinate with the USACE to ensure such consultations cover potential USACE actions.

The proposed action requires a Section 404 permit from the USACE because the project would include the addition of riprap fill below the ordinary high water line (OHWL) of Yale Reservoir. On April 27, 2022, PacifiCorp applied for a Section 404 permit from the USACE, and the application is currently being processed. At the time of this analysis, PacifiCorp has not yet

received regulatory authorization for impacts to Yale Reservoir under Nationwide Permit 31, for maintenance of existing flood control facilities.

5.2.4 Washington State Department of Ecology, Section 401 Water Quality Certification

Under Section 401(a)(1) of the CWA, FERC may not issue a license for a hydroelectric project unless the state water quality certifying agency has issued a water quality certification for the project or has waived certification by failing to act within a reasonable period of time, not to exceed 1 year. Section 401(d) of the CWA provides that state certification shall become a condition of any federal license that authorizes construction or operation of the project.

On February 3, 2005, PacifiCorp applied to the Washington State Department of Ecology (Ecology) for Section 401 water quality certification associated with Yale Project licensing. PacifiCorp subsequently withdrew and refiled its application on December 2, 2005. On October 9, 2006, Ecology issued the certification (Ecology 2006). Pursuant to Section 4.1(9) of the water quality certification, Ecology issued amendments on December 21, 2007, and January 17, 2008. Consequently, PacifiCorp obtained a 401 certification for the Yale Project that covers the proposed action. Section 4.5.2(b) of the water quality certification requires preparation of an in-water work protection plan (IWWPP) to protect water resources during in-water work activities. PacifiCorp is currently developing an IWWPP to demonstrate compliance with the existing Section 401 water quality certification for the Yale Project.

5.2.5 Endangered Species Act, Section 7

Section 7 of the ESA requires federal agencies to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or result in the destruction or adverse modification of the critical habitat of such species. The Biological Opinions for the FERC relicensing of the Lewis River Hydroelectric Projects, published by USFWS in 2006 and by NMFS in 2007, address most activities under the proposed action (USFWS 2006; NMFS 2007).

PacifiCorp is currently preparing supplemental ESA documentation to address aspects of the proposed action that are not addressed in the prior Biological Opinions. PacifiCorp has initiated Section 7 consultation with NMFS and USFWS.

5.2.6 Magnuson-Stevens Fishery Conservation Management Act

The MSA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), requires that regional Fishery Management Councils, through federal Fishery Management Plans, describe and identify EFH for each federally managed species; minimize, to the extent practicable, adverse effects on such habitat caused by fishing; and identify other actions to encourage the conservation and enhancement of such habitats. Congress defines EFH as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity” (16 United States Code 1802[10]). Habitats used at any time during a species’ life cycle (i.e., during at least one of its life stages) must be accounted for when describing and identifying EFH. The NMFS Biological Opinion for

the FERC relicensing of the Lewis River Hydroelectric Projects, which was published in 2007, addresses EFH (NMFS 2007).

5.2.7 National Historic Preservation Act, Section 106

Section 106 of the NHPA requires that FERC evaluate the potential effects of the proposed undertaking on properties listed or eligible for listing in the National Register of Historic Places (National Register). Such properties listed or eligible for listing in the National Register are called historic properties. Section 106 also requires that FERC seek concurrence with the State Historic Preservation Officer on any finding of effect or no effect on historic properties and allow the Advisory Council on Historic Preservation (ACHP) an opportunity to comment on any finding of effects on historic properties. If Native American properties have been identified, Section 106 also requires that FERC consult with interested Tribes that might attach religious or cultural significance to such properties.

In assessing the proposed action, FERC will evaluate whether any historic properties may be affected within the project's area of potential effects and allow the ACHP an opportunity to comment. To assist FERC in this evaluation, PacifiCorp has prepared a cultural resources summary memorandum to evaluate the potential effects on cultural resources resulting from the Saddle Dam Seismic Remediation project, focusing specifically on the portions of the action area where effects may occur. The memorandum provides an overview of the regulatory context, a summarization of previous investigations, and a brief analysis of potential impacts to historical and archaeological resources. The Cultural Resources Summary for the Saddle Dam Seismic Remediation Project will be submitted for review under separate cover, due to the sensitivity of the information provided.

5.2.8 Pacific Northwest Power Planning and Conservation Act, Section 4(h)

Under Section 4(h) of the Pacific Northwest Power Planning and Conservation Act, the Northwest Power Planning Council developed the Columbia River Basin Fish and Wildlife Program (Program) to protect, mitigate, and enhance the fish and wildlife resources associated with development and operation of hydroelectric projects in the Columbia River basin. Section 4(h) states that responsible federal and state agencies should provide equitable treatment for fish and wildlife resources, in addition to other purposes for which hydropower is developed, and that these agencies should take the Program into account to the fullest practical extent. The Program directs agencies to consult with fish and wildlife managers and the Northwest Power Planning Council during the study, design, construction, and operation of any hydroelectric development in the basin (Sections 12.1A. through 12.1A.2). As described above, PacifiCorp is consulting with affected Tribes and wildlife agencies pursuant to the Lewis River Settlement Agreement and FERC regulations and will provide these groups with opportunities to review and comment on the application.

5.2.9 Federal Power Act, Section 4(e) Conditions

Section 4(e) of the Federal Power Act requires any license issued by FERC for a project located within a federal reservation to be subject to and contain such conditions as the secretary of the responsible federal land management agency deems necessary for the adequate protection and use

of the reservation. The Yale Project occupies federal lands administered by the Bureau of Land Management.

5.2.10 Coastal Zone Management Act

Cowlitz County is not considered a coastal county of the State of Washington. Therefore, this regulatory requirement is not applicable to the proposed action.

6.0 Environmental Analysis

6.1 General Description of Project Area

The project area includes Yale Saddle Dam, Yale Reservoir, and portions of Saddle Dam Park. Figure 6-1 provides a general overview of the project area, and Figure 6-2 shows existing conditions in the project area.

Yale Saddle Dam is located on the shoreline of Yale Reservoir. A dirt path traverses the crest of the dam. The downstream face of the dam is covered with mowed grass. The upstream face of the dam is covered by grass on the upper portion, transitioning to riprap partway down the slope and extending to the toe. The reservoir is generally devoid of vegetation adjacent to the toe of the dam, and the reservoir bed is covered in mud and silt, with the exception of patches of aquatic vegetation such as Canadian waterweed (*Elodea canadensis*) in shallow areas.

Yale Reservoir is approximately 10.5 miles long and has a surface area of approximately 3,800 acres at elevation 490 feet amsl, the normal maximum reservoir level (i.e., full pool elevation or OHWL). However, the maximum operating level is currently restricted to 480 feet amsl (10 feet below normal operating levels) as a mitigation measure for the current seismic stability concern.

Saddle Dam Park west of the dam contains a large, regularly mowed field with scattered trees that is surrounded by forest. The field is vegetated predominantly with non-native grasses and forbs. This area of the park (Saddle Dam Farm) is the site of the Frasier homestead, and remnant orchards from the homestead are still present. Saddle Dam Farm is managed as part of the Lewis River Wildlife Habitat Management Plan (WHMP) as important foraging habitat for Roosevelt elk (*Cervus canadensis roosevelti*). The fields are managed specifically as a source of forage for elk, with hedgerows breaking up line-of-site and providing browse.

Frasier Creek and associated diversion channels, ponds, and wetlands occur along the west side of the park, and Stream 4 (also known as Saddle Dam Creek), a seasonal stream, flows into Yale Reservoir in the northeast corner of the project area.

6.2 Resource Areas and Analysis

6.2.1 Geology and Soil Resources

6.2.1.1 Affected Environment

Numerous geologic and geotechnical studies have been prepared related to the planning and construction of the Yale Dam and Yale Saddle Dam, beginning in the 1920s. The summary of site geology below is taken from the most recent Geotechnical Data Report (AECOM 2022b), which reviews and appends several of the previous studies.

The Yale Saddle Dam site is in the Lewis River Valley at the southern end of Yale Reservoir, approximately 1,000 feet north of the Yale Dam spillway. The Lewis River drains a portion of the western slope of the Cascade Range in southwestern Washington, including several tributaries that originate on the southern and eastern flanks of Mount St. Helens, an active volcano. Mount St. Helens has experienced multiple episodes of volcanic activity in the past 50,000 years, several of which have contributed volcaniclastic sediment to the Lewis River drainage. The most recent (current) episode includes the large volcanic debris avalanche and associated lahars (debris flows primarily composed of volcanic material) that accompanied the May 1980 eruption, which removed a significant portion of the northern flank and summit of the volcano. Although the 1980 eruption and subsequent events have not substantially affected the Lewis River (on the opposite side of the mountain from the destructive, northward-directed eruption), evidence exists of past similar events that have affected the Lewis River basin and the volcanically derived sediments present at the Yale Saddle Dam site.

Yale Saddle Dam is underlain by soils derived from volcaniclastic, glacio-fluvial, and alluvial sediments that have been emplaced in the past 50,000 years. The soils were deposited by lahars, lahar run-out flows (i.e., sediment-rich flows, generally devoid of coarse gravel, which represent the distal portions of lahars), ash fall, Cascade alpine glaciers, and the ancestral and modern Lewis River alluvial processes. Alluvial deposits more than 30 feet thick, interbedded with lahar flows, have been observed along the western shoreline of Yale Reservoir upstream of Yale Saddle Dam (Major and Scott 1988).

The relatively thick sequence of volcanically derived sediment that is present beneath and downstream from Yale Saddle Dam (locally greater than 120 feet thick) is composed primarily of poorly graded sand, silty sand (with gravel), sandy silt, well-graded gravel with sand, and clayey gravel with sand. The upper alluvial unit and the transition layer have highly variable and unusual engineering properties attributed to the presence of minerals derived from chemical weathering of the volcanic sediments and glass. Soils in this area have been mapped by the Natural Resources Conservation Service as Andisols, which developed in volcanic ash or other volcanic ejecta (NRCS 2022). The area immediately downstream of Yale Saddle Dam, including Saddle Dam Park, is mapped as Cinebar silt loam, which developed in volcanic ash overlying glaciofluvial deposits.

Yale Saddle Dam spans a topographic low, separated from the current main channel of the Lewis River by a bedrock high of Tertiary volcanic rocks. In the left abutment of Yale Saddle Dam, these rocks consist primarily of volcanic breccia. The steep mountain slopes north and east of Saddle

Dam Park are mapped as Newaukum gravelly and cobbly silt loams, which formed in colluvium and glaciofluvial deposits with an admixture of volcanic ash. Tertiary volcanic rocks (basaltic andesite) underlie the glaciofluvial deposits (WDNR 2022). Slope gradients in this area range up to 45 percent. Cowlitz County recognizes these steep slopes as geologically hazardous areas (AECOM 2022c) because they are susceptible to soil erosion. Potential erosion hazard on Newaukum soils on slopes over 30 percent is severe (NRCS 2022). Cowlitz County EPIC Mapper (2022) does not indicate or map any deep-seated landslides, deep-seated landslide scarps, or potentially unstable slopes in the vicinity of Yale Saddle Dam.

The project area is located in a liquefaction area with low to moderate susceptibility for liquefaction during a seismic event (Palmer et. al 2004). Liquefaction susceptibility is an estimate of the likelihood that soil would liquefy as a result of earthquake shaking. The proposed action is intended to mitigate for potential liquefaction hazards associated with the current design of Yale Saddle Dam.

6.2.1.2 Environmental Effects

6.2.1.2.1 Construction-Related Effects

Construction activities under the proposed action would primarily impact Yale Saddle Dam and Saddle Dam Park. Total volumes of excavation and fill are estimated at approximately 20,000 cubic yards and 92,500 cubic yards, respectively. All fill materials would either be reused materials from the project or imported from an off-site commercial source. There is no borrow pit associated with the project. Materials would either be stockpiled on-site or transported directly to the dam embankment and placed. Approximately 12 acres would be disturbed at the modified dam area and central drainage swale.

The proposed construction footprint would avoid the steep slopes west of Frasier Creek and north of Yale Saddle Dam. Nevertheless, disturbance, removal, stockpiling, and transporting this volume of soils and fill materials could result in runoff and erosion into Yale Reservoir and/or Frasier Creek, especially if significant precipitation events were to occur during construction.

Construction is scheduled to last approximately 18 months, during which significant precipitation events are likely to occur. Impacts associated with construction activities would be short term in duration. Potentially significant impacts would be avoided through the implementation of proposed protection measures discussed in Section 6.2.1.2.3.

6.2.1.2.2 Operations-Related Effects

The proposed action to perform a seismic rehabilitation of Yale Saddle Dam would not result in operational changes to the dam or the larger Lewis River Hydroelectric Project. Following construction, the normal maximum operating elevation of the reservoir would revert to 490 feet amsl, and no additional lands would be inundated or subject to shore erosion. Any shoreline erosion is likely to be reduced by the placement of supplemental riprap on the upstream face of the dam. The long-term effects of the proposed action would be beneficial because the project would reduce the risk of catastrophic failure of the dam during a seismic event.

6.2.1.2.3 Proposed Protection Measures and Analysis

PacifiCorp proposes the following measures to minimize impacts to geology and soil resources:

- Appropriate best management practices (BMPs) would be utilized and maintained to minimize the transport of soils and sediments outside of the limits of construction. The construction contractor would be required to comply with a TESC plan that would be implemented to manage construction stormwater runoff during construction. The TESC plan would comply with conditions contained in the construction stormwater general permit that would be obtained for the project.
- The limit of disturbance would be clearly marked on the ground. Orange construction fencing and signage would be erected along laydown area boundaries and for exclusion of sensitive areas such as wetlands. The construction contractor would be responsible for restoring laydown areas to the pre-existing grade and condition.
- Existing fill material removed from the dam face, including the ADA ramp, would be transported off-site and disposed of at an approved disposal facility. Existing topsoil removed from the dam face would be reused on-site where feasible, and the remainder would be transported off-site for disposal at an approved disposal facility.

6.2.1.3 Effects of the No-Action Alternative

The no-action alternative assumes that Yale Reservoir would be restricted to a maximum operation elevation of 480 feet amsl, and no action (i.e., construction) would be completed at Saddle Dam. This would have no effect on geology and soil resources.

6.2.2 Water Quantity

6.2.2.1 Affected Environment

Yale Reservoir (also known as Yale Lake) is a 3,800-acre reservoir formed by Yale Dam, located in Water Resource Inventory Area (WRIA) 27 (Lewis). The Yale Dam was completed in 1953. The reservoir is approximately 10.5 miles long and has a normal maximum operating level of 490 feet amsl (PacifiCorp 2020a). At this level, the reservoir's gross storage capacity is 402,000 acre-feet, with a usable storage capacity of 190,000 acre-feet. Yale Reservoir is currently restricted to 480 feet amsl. The normal operating reservoir elevation is between 470 and 490 feet amsl, although reservoir levels drop as low as 460 feet amsl on a yearly basis during winter months. The minimum operating elevation is 430 feet amsl (PacifiCorp 2020a). The drainage area for the reservoir is 596 square miles. The forebay of the Yale Dam is downstream of Yale Reservoir, and water from the reservoir is discharged into Merwin Lake via the tailrace at Yale Dam.

The Yale Project is one component of the larger Lewis River Hydroelectric Project, which is operated to achieve optimum benefits for power production and flood management and to provide for resources such as fish, wildlife, and recreation (PacifiCorp 2020a). Yale Reservoir, along with two other Lewis River reservoirs, store and release water as needed to meet hydroelectric project needs. The Lewis River system is fed by precipitation and spring snowmelt from the Cascade Range; therefore, the amount of water entering the drainage can vary depending on climatic

conditions, and during drought years there may be persistent low water levels that affect water levels throughout the Lewis River system (PacifiCorp 2019).

Based on data from 2019 to 2021 (USGS 2022a), the annual water surface elevation for Yale Reservoir has averaged between 475 and 478 feet amsl. Based on monthly mean data (USGS 2022b), water levels in the reservoir are generally highest in late spring and early summer and lowest in late fall. During the fall and winter months, reservoir levels are variable due to management for flood control and power generation. During the summer recreation season, PacifiCorp attempts to maintain relatively high stable water levels in Yale Reservoir (FERC 2006). A wetland and waters delineation for the project in April 2020 identified four streams, two constructed ponds, and three wetlands in the project vicinity (AECOM 2022c). Wetlands, streams, and ponds are also discussed in Section 6.2.5.

Frasier Creek is a perennial stream west of the project area that flows roughly north-south from hillslopes to the northwest. Water from this stream is partially diverted via two created diversion channels to two ponds that were constructed to provide wildlife habitat. There is no surface water connection between these aquatic features and Yale Reservoir in the project vicinity; Frasier Creek eventually flows into the Lewis River downstream of Yale Dam and the project area.

Stream 4 (Saddle Dam Creek) is an intermittent second-order stream that enters the project area from over a basalt cliff and flows into Yale Reservoir near the northeastern end of the Yale Saddle Dam. This stream comes within 45 feet of the area of riprap rehabilitation.

6.2.2.2 Environmental Effects

6.2.2.2.1 Construction-Related Effects

During construction, PacifiCorp would route water away from Yale Reservoir to other portions of the Lewis River system to temporarily lower the water level in the reservoir to 465 feet amsl. This water level is below the normal minimum operating elevation (470 feet amsl) but above the minimum operating elevation (430 feet amsl). No surface water withdrawals or diversions outside the Lewis River system would occur. The water quantity in the delineated streams, ponds, and wetlands would not be affected by the project because no work would occur in these features. In addition, TESC measures would be implemented to minimize stormwater runoff in order to protect these areas that lie outside the construction limits of the project. Effects to water quantity would be localized and would occur only during the 2-week period in the winter when riprap rehabilitation work would take place.

Water would be needed for fill moisture conditioning during the placement of fill for the dam embankment. Water would be delivered to the site from commercial sources if needed. A consumptive water right for use from the reservoir would also be pursued.

6.2.2.2.2 Operations-Related Effects

The proposed action to perform a seismic rehabilitation of Yale Saddle Dam would not result in operational changes to the dam or the larger Lewis River Hydroelectric Project. The reservoir would return to a normal maximum operating level of 490 feet amsl, so no other effects to water quantities within the Lewis River system are anticipated.

This project provides a beneficial impact by reducing the risk of seepage through the dam from a large magnitude seismic event, which would affect the ability to store water in Yale Reservoir.

6.2.2.2.3 Proposed Protection Measures and Analysis

Because the drawdown would be temporary and above the minimum operating elevation (430 feet amsl), no protection measures would be necessary. However, PacifiCorp proposes to minimize the effects of the reservoir drawdown on resources that rely on water quantity by conducting the drawdown during a 2-week period in the winter (in December and/or January) when the least amount of fish and fish habitat would be affected (see Section 6.2.4).

6.2.2.3 Effects of the No-Action Alternative

The no-action alternative assumes that Yale Reservoir would be restricted to a maximum operation elevation of 480 feet amsl, and no action (i.e., construction) would be completed at Saddle Dam. This would affect reservoir water quantities in the larger Lewis River system and how PacifiCorp manages those reservoir water quantities to maintain normal operating levels. Operating at the lower reservoir level of 480 feet amsl will affect power generation over the long-term.

6.2.3 Water Quality

6.2.3.1 Affected Environment

Based on water quality standards promulgated in WAC 173-201A, Yale Reservoir is designated for all fresh water beneficial uses, which include the following (Ecology 2022a):

- Aquatic life uses (core summer salmonid habitat)
- Recreational uses (primary contact recreation)
- Water supply uses (domestic, agricultural, industrial, and stock watering)
- Miscellaneous uses (wildlife habitat, harvesting, commerce and navigation, boating, and aesthetics

Associated water quality standards to maintain these uses include a maximum temperature of 16°C (60.8°F), minimum dissolved oxygen of 10 milligrams per liter, pH between 6.5 and 8.5, and maximum turbidity 5 nephelometric turbidity units (NTU) over background (for background 50 NTU or less) or a 10 percent increase in turbidity (for background greater than 50 NTU) (WAC 173-201A; Ecology 2022a).

Per the Washington State Water Quality Assessment, there are no 303(d) or other water quality listings in the project vicinity for Yale Reservoir or other waters. The stretch of the Lewis River just downstream of Yale Dam, near the tailrace, is listed as Category 4B and has a pollution control plan in place for total dissolved gas. This area has also been tested for temperature and meets the standards (Ecology 2022a). A segment of the Lewis River about 0.75 mile downstream of the Yale powerhouse is listed as a water of concern for total dissolved gas (Ecology 2022a). These water quality concerns are associated with operation of the dam.

There are no documented groundwater quality concerns in the project vicinity (Ecology 2022b). Based on mapping from Cowlitz County (Cowlitz County 2022), there are no wellhead protection zones or critical aquifer recharge areas mapped in the project vicinity. The closest wellhead protection zones and associated critical aquifer recharge areas are approximately 900 feet south of the project disturbance limits.

6.2.3.2 Environmental Effects

6.2.3.2.1 Construction-Related Effects

During the construction period, short-term, localized water quality impacts could occur if sediment, debris, stormwater, or unintentional releases from construction work and staging areas were to enter project area waters. The design of project and construction layout sites is intended to avoid water quality impacts to Frasier Creek and associated ponds and channels, as construction disturbance limits would be greater than 200 feet from these waters. Riprap rehabilitation in the vicinity of Stream 4 would have the potential to result in the release of sediments into the stream. These risks would be minimized through implementation of BMPs to minimize the transport of silt and sediments outside of construction limits and preparation of a TESC plan to manage construction stormwater runoff. The TESC plan would comply with conditions contained in a construction stormwater general permit obtained for the project. A Spill Prevention, Control, and Countermeasure Plan (SPCCP) would be developed and implemented to minimize the risk of water quality contamination from spills of diesel, gas, oil, or hydraulic fluid.

Riprap rehabilitation work would have the potential to impact water quality in Yale Reservoir through the release of sediment and other construction pollutants. Drawdown of the reservoir would allow the work to be conducted during dry conditions and would avoid stirring up lakebed sediments in the water column. In addition, no equipment would drive across the lakebed during construction or riprap replenishment activities.

6.2.3.2.2 Operations-Related Effects

The proposed action to perform a seismic rehabilitation of Yale Saddle Dam would not result in operational changes to the dam or the larger Lewis River Hydroelectric Project, with the exception of allowing the reservoir to return to a normal maximum operating level of 490 feet amsl. No operational effects to water quality above baseline levels are anticipated during project operations.

The existing septic system and leach field would be decommissioned and replaced with a new septic system in a different location. Potential risks to groundwater quality from the septic system are expected to be similar to those at present.

6.2.3.2.3 Proposed Protection Measures and Analysis

As described above, proposed measures to protect water quality include construction BMPs designed to prevent the movement of sediment from construction sites, a TESC plan and associated measures to manage stormwater runoff, and an SPCCP. Sediment ponds or suitable BMPs would be installed as needed to control the transport of silt and sediments outside of the limits of construction.

6.2.3.3 Effects of the No-Action Alternative

Under the no-action alternative, PacifiCorp would maintain a maximum operating elevation of 480 feet amsl for Yale Reservoir indefinitely, or until seismic concerns are addressed for the Yale Saddle Dam. The no-action alternative would have no impact on most water quality standards, including temperature, dissolved oxygen, and pH. Erosion and transport of newly exposed unvegetated sediments could result in localized increases in turbidity in the reservoir over the short term. However, these impacts would be expected to lessen over time as new vegetation establishes.

6.2.4 Fisheries and Other Aquatic Resources

6.2.4.1 Affected Environment

Fish known to occur in Yale Reservoir and its tributaries include coho (*Oncorhynchus kisutch*) kokanee (landlocked sockeye salmon) (*O. nerka*), bull trout (*Salvelinus confluentus*), resident rainbow trout (*O. mykiss*), resident coastal cutthroat trout (*O. clarkii clarkii*), northern pikeminnow (*Ptychocheilus oregonensis*), brook trout (*S. fontinalis*), mountain whitefish (*Prosopium williamsoni*), sculpin (*Cottoidea* sp.), three-spine stickleback (*Gasterosteus aculeatus*), and largescale sucker (*Catostomus macrocheilus*). Kokanee are not native to the Lewis River basin but were introduced following dam construction to enhance the recreational fishery. Kokanee, bull trout, and rainbow trout are state priority fish species. Bull trout and coho, which are federally listed threatened species, are discussed in Section 6.2.6.

Yale Reservoir is mapped as having historical populations of naturally spawning Lower Columbia River Chinook salmon (*O. tshawytscha*) (federally listed as threatened) and steelhead trout (*O. mykiss*) (federally listed as threatened). This habitat is currently considered blocked by the major dams on the Lewis River (FERC 2006). However, both species have been observed in Yale Reservoir having passed down from Swift Reservoir, which is now available habitat for these species. These federally listed threatened species are also discussed in Section 6.2.6.

Amphibians that may occur in the project area are discussed in Section 6.2.5.

6.2.4.2 Environmental Effects

6.2.4.2.1 Construction-Related Effects

The reservoir would be drawn down to an elevation of 465 feet amsl, within normal operating levels for the reservoir, to facilitate the placement of riprap on the upstream face of the dam along the shoreline. PacifiCorp anticipates conducting the drawdown during a 2-week period in December and/or January during periods of normally low reservoir pool elevations. The proposed drawdown elevation is unlikely to result in a loss of unique habitat for fish or result in fish stranding. There would be a temporary loss of linear feet of habitat from the minimized circumference of the reservoir. However, conducting the drawdown during the winter months would minimize impacts to fish due to the loss of littoral habitat, as most fish species that over-winter in the reservoir move into the deeper pelagic zones during this time. Construction activities on the shoreline and below the OHWL in the reservoir may result in elevated sediment levels in the reservoir and could result in short-term impacts to aquatic species.

6.2.4.2.2 Operations-Related Effects

As discussed in Section 3.3, the normal maximum operating elevation of the reservoir is 490 feet amsl. During the summer, water levels are normally maintained between 480 and 490 feet amsl, averaging 487 feet amsl, with daily fluctuations of generally less than 1 foot. During the winter and spring, water levels are normally maintained at 475 feet amsl on average. Currently, the reservoir is restricted to a maximum operating elevation of 480 feet amsl. Following construction, the normal maximum operating elevation of the reservoir would revert to 490 feet amsl, and the project would continue to operate under the terms and conditions of the existing license. Reverting to a normal maximum operating elevation of 490 feet amsl would increase the linear feet of shoreline and available habitat for fish during the summer months compared to current operations. No other effects to fish and other aquatic resources are anticipated.

6.2.4.2.3 Proposed Protection Measures and Analysis

PacifiCorp proposes the following measures to minimize impacts to fish and other aquatic resources:

- To minimize potential impacts to fish and fish habitat, the reservoir drawdown would be conducted during a 2-week period in the winter, in December and/or January, when most fish that overwinter in the reservoir move to deeper zones.
- To mitigate for potential fish stranding during drawdown of the reservoir, PacifiCorp would deploy crews at strategic locations around the reservoir once the drawdown elevation is reached, to conduct fish salvage as needed.
- To minimize the potential for elevated sediment levels in the reservoir from construction activity along the shoreline and below the OHWL, suitable BMPs would be installed to minimize the transport of silt and sediments outside of the limits of construction.
- The construction contractor would be required to comply with a TESC plan that would be implemented to manage construction stormwater runoff. The TESC plan would comply with conditions contained in the construction stormwater general permit that would be obtained for the project.

6.2.4.3 Effects of the No-Action Alternative

Under the no-action alternative, PacifiCorp would maintain a maximum operating elevation of 480 feet amsl for Yale Reservoir indefinitely, or until seismic concerns are addressed for the Yale Saddle Dam. This would result in a continued and long-term loss of linear feet of habitat during the summer months from the minimized circumference of the reservoir and loss of littoral habitat but is not expected to result in a loss of unique habitat for fish. The loss of habitat during the summer months could impact bull trout, Chinook salmon, steelhead, and other fish that occur in Yale Reservoir.

6.2.5 Wildlife, Botanical, and Wetland Resources

6.2.5.1 Affected Environment

6.2.5.1.1 Wildlife

More than 100 bird species have been documented in the general project area, including passerine birds (e.g., thrushes, warblers, and chickadees), woodpeckers, raptors (e.g., owls, hawks, eagles, and falcons), herons, grebes, loons, and shorebirds (e.g., gulls) (FERC 2006). State priority bird species that have been documented in the Frasier Creek wetlands, on Yale Pond (south of Lewis River) or Yale Reservoir, or in the project vicinity include northern spotted owl (*Strix occidentalis caurina*), common loon (*Gavia immer*), bufflehead (*Bucephala albeola*), dusky grouse (formerly, blue grouse; *Dendragapus obscurus*), great blue heron (*Ardea herodias*), hooded merganser (*Lophodytes cucullatus*), Vaux's swift (*Chaetura vauxi*), and wood duck (*Aix sponsa*). Northern spotted owl, a federally listed threatened species, is discussed further in Section 6.2.6.

Bald eagles (*Haliaeetus leucocephalus*), protected under the Bald and Golden Eagle Protection Act, use the project vicinity for wintering and breeding. One bald eagle nest and two bald eagle roost core areas are documented within 1 mile of the project area. The bald eagle nest and one of the bald eagle nest roost core areas are located approximately 0.9 mile south of the project area on the south side of the Lewis River; the other bald eagle roost core area is located approximately 0.9 mile southeast of Saddle Dam Park.

Mammals known to occur in the general project area include Roosevelt elk, deer, Douglas squirrel, Townsend's chipmunk, beaver, mink, black bear, bobcat, river otter, and coyote. Raccoon and other small mammal and bat species are also likely to occur. Columbia black-tailed deer and Roosevelt elk are state priority mammal species that have been documented in the project vicinity. There are over 200 Roosevelt elk in the Yale Reservoir valley, which is used for wintering habitat, and elk are known to use the fields and meadows in Saddle Dam Park year round. The WDFW designates Roosevelt elk as a species of recreational, commercial, or tribal importance that is vulnerable and a state priority species.

Larch Mountain salamander (*Plethodon larselli*) (a state-listed sensitive species) is known to occur within 1 mile of the project area, but no occurrences have been documented on Yale Saddle Dam or within Saddle Dam Park.

Federal or state endangered, threatened, candidate, sensitive, and priority wildlife species that have a primary association with habitat on or adjacent to the project area (within 300 feet) are listed in Table 6-1. Threatened and endangered species are discussed further in Section 6.2.6.

Table 6-1 Endangered, Threatened, Candidate, Sensitive, and Priority Species with a Primary Association with Habitat in or Adjacent to the Project Area

Species	Federal Status	State Status[1]	Habitat in Project Vicinity[2]
BIRDS			
Northern spotted owl (*Strix occidentalis caurina*)	Endangered	Endangered	Suitable habitat in forested areas adjacent to project area.
Common loon (*Gavia immer*)	None	Sensitive (breeding areas, migratory stopovers, regular concentrations)	Found on Yale Reservoir; breeding unlikely due to lack of suitable habitat.
Bufflehead (*Bucephala albeola*)	None	Priority Species (breeding areas)	Observed on project reservoir wetlands in winter; no known nesting.
Hooded merganser (*Lophodytes cucullatus*)	None	Priority Species (breeding areas)	Observed breeding in Frasier Creek/wetlands.
Wood duck (*Aix sponsa*)	None	Priority Species (breeding areas)	Observed breeding in Frasier Creek/wetlands.
Dusky grouse (formerly, blue grouse) (*Dendragapus obscurus*)	None	Priority Species (breeding areas, regular concentrations)	Observed in Yale Project vicinity.
Great blue heron (*Ardea herodias*)	None	Priority Species (breeding areas)	Common along Yale Reservoir and in wetlands. No known breeding sites.
Vaux's swift (*Chaetura vauxi*)	None	Priority Species (breeding areas, communal roosts)	Observed on lands near Yale Project.
MAMMALS			
Columbia black-tailed deer (*Odocoileus hemionus columbianus*)	None	Priority Species	Wintering habitat on and adjacent to project area.
Roosevelt elk (*Cervus canadensis roosevelti*)	None	Priority Species	Wintering habitat on and adjacent to project area.
AMPHIBIANS			
Cascade torrent salamander (*Rhyacotriton cascadae*)	Petitioned for listing	Candidate	Found in tributary streams/seeps to Yale Reservoir.

Species	Federal Status	State Status[1]	Habitat in Project Vicinity[2]
Larch Mountain salamander (*Plethodon larselli*)	None	Sensitive	Large population on face of nearby Yale Dam and base of an adjacent cliff; none documented at Saddle Dam/Park.

[1] WDFW 2021a, 2021b

[2] FERC 2006; NMFS 2007, 2016; PacifiCorp 2021a; WDFW 2021a; USFWS 2010

6.2.5.1.2 Botanical Resources

Upland herbaceous habitat in the project area contains mostly non-native grasses and forbs. The field west of Yale Saddle Dam has been periodically seeded with a mix of perennial ryegrass (*Lolium perenne*), orchardgrass (*Dactylis glomerata*), and white clover (*Trifolium repens*) (PacifiCorp 2008). Other common grasses include creeping bentgrass (*Agrostis stolonifera*), sweet vernalgrass (*Anthoxanthum odoratum*), annual bluegrass (*Poa annua*), and common velvetgrass (*Holcus lanatus*). Common herbs include Queen Anne's lace (*Daucus carota*), hairy cat's-ear (*Hypochaeris radicata*), ox-eye daisy (*Leucanthemum vulgare*), common dandelion (*Taraxacum officinale*), and English plantain (*Plantago lanceolata*).

Upland forests are dominated by Douglas-fir (*Pseudotsuga menziesii* var. *menziesii*), western hemlock (*Tsuga heterophylla*), bigleaf maple (*Acer macrophyllum*), and red alder (*Alnus rubra*). The shrub layer includes snowberry (*Symphoricarpos albus*), dull Oregon-grape (*Mahonia nervosa*), salmonberry (*Rubus spectabilis*), dewberry (*Rubus ursinus*), Himalayan blackberry (*Rubus armeniacus*), osoberry (*Oemleria cerasiformis*), red huckleberry (*Vaccinium parvifolium*), beaked hazelnut (*Corylus cornuta* ssp. *californica*), and salal (*Gaultheria shallon*). The herbaceous layer includes western sword fern (*Polystichum munitum*), Pacific bleedingheart (*Dicentra formosa* ssp. *formosa*), Oregon wood-sorrel (*Oxalis oregana*), Siberian springbeauty (*Claytonia sibirica*), stinging nettle (*Urtica dioica* ssp. *gracilis*), wild lily-of-the-valley (*Maianthemum dilatatum*), fringecup (*Tellima grandiflora*), and stream violet (*Viola glabella*). Openings in the forest are dominated by bracken fern (*Pteridium aquilinum* ssp. *pubescens*), snowberry, and various grasses and forbs. Some large, introduced American chestnut (*Castanea dentata*) trees are present at the western edge of the fields in Saddle Dam Park and are associated with an old homestead.

6.2.5.1.3 Wetland Resources

AECOM conducted a delineation of wetlands and other waters of the U.S. in Saddle Dam Park in April 2022 to support project planning, design, and permitting. AECOM prepared a Wetland Delineation and Critical Areas Report (AECOM 2022c) that was submitted to the USACE as part of the CWA Section 404 permit application. The CWA Section 404 permit application also included a Joint Aquatic Resources Permit Application (JARPA) form and drawings. The JARPA form provides an overall description of the project and existing site conditions, a description of wetlands and other waterbodies on and adjacent to the project area, a list of ESA-listed species and other special status species that might be affect by the project, project construction activities, and anticipated impacts to wetlands and other waterbodies, including excavation and fill quantities,

and impact avoidance and minimization measures. Drawings illustrating existing site conditions (including delineated wetlands and other waters), the overall project layout, the construction layout, the existing dam excavation plan, the proposed filter and drain berm plan, and proposed riprap rehabilitation plan were also provided.

The wetland delineation field investigation confirmed the presence of three wetlands, four streams, and two ponds in the project vicinity (AECOM 2022c). Non-wetland waterbodies are discussed in Section 6.2.2. The wetlands, listed in Table 6-2, are all adjacent to, or impoundments of, Frasier Creek, which is a perennial tributary of the Lewis River. They are therefore presumed to be jurisdictional wetlands regulated by Section 404 of the federal CWA. The three wetlands are all more than 1,800 feet from Yale Saddle Dam.

Table 6-2 Wetlands Delineated in the Project Vicinity

Name	Cowardin Class	Hydrogeomorphic Class	Size (acre)	Rating
Wetland A	Emergent/Scrub-shrub/Open Water	Depressional/Riverine	0.51	Category III
Wetland 2A	Emergent	Riverine/Slope	0.04	Category III
Wetland 3A	Emergent/Open Water	Depressional/Riverine	0.70	Category III

The proposed action construction limits have been designed to avoid work within 200 feet of the wetlands, streams, and ponds identified in the project area.

6.2.5.2 Environmental Effects

6.2.5.2.1 Construction-Related Effects

6.2.5.2.1.1 Wildlife

Birds

Bald Eagle

The proposed action would have no direct effects on the nearby eagle nest or roost core areas because the proposed drawdown and construction activities would not affect these areas. Construction activities and noise may temporarily effect eagle use (hunting and fishing) at the project area and in Yale Reservoir.

Common Loon

Priority areas for the common loon are breeding sites, migratory stopovers, and regular concentrations (WDFW 2021a). Loons have been documented nesting on lakes and reservoirs in other parts of the state but have not been documented nesting on Yale Reservoir (FERC 2006). During migration, they are common in the Puget Trough and eastern Washington but are uncommon to rare in the western Cascades. However, common loons have been observed on Yale Reservoir (FERC 2006). The common loon is vulnerable to shoreline alteration and development, fluctuations in water levels during nesting (including reservoir drawdowns), and human disturbance in the vicinity of nesting areas (WDFW 2004).

The proposed modifications to the dam would not substantially alter the existing shoreline condition and would not alter aquatic habitat in the reservoir that may be used by common loons. Because common loons are not known to nest in Yale Reservoir, drawdown of the reservoir for riprap placement below the OHWL and human disturbance associated with the project are unlikely to impact breeding sites for this species. Construction activity, including construction noise and the reservoir drawdown, may disturb common loons using the reservoir as a migratory stopover site, but they are likely to avoid the project area during construction.

Bufflehead

Priority areas for buffleheads are breeding areas (WDFW 2021a). Buffleheads have been observed in Yale Reservoir and associated wetlands in winter (FERC 2006). They are common to fairly common winter residents in the western Cascades from October through May. Buffleheads breed in boreal forests, and Washington is on the southern end of their breeding range. They are not known to breed in the general project area (FERC 2006).

The project would have no impact on priority areas for buffleheads. Construction activities, including construction noise and the reservoir drawdown, may disturb buffleheads using the Frasier Creek ponds and Yale Reservoir, and they may avoid the project area during construction.

Hooded Merganser and Wood Duck

Priority areas for hooded mergansers and wood ducks are breeding areas (WDFW 2021a). Hooded mergansers and wood ducks have been observed breeding in the Frasier Creek wetland system on the west side of Saddle Dam Park (FERC 2006).

The project would have no direct or indirect impact on breeding areas for these species, as the construction disturbance limits would be greater than 200 feet from the wetlands, streams, and ponds on the west side of the park that could be used for breeding. Construction activity, including construction noise, may disturb hooded mergansers and wood ducks using Frasier Creek and its associated wetlands, ponds, and adjacent riparian habitat. These species may avoid the project area during the construction period due to noise disturbance.

Dusky Grouse

Priority areas for dusky grouse are breeding areas and regular concentrations (WDFW 2021a). Dusky grouse inhabit mountainous areas with open coniferous forests and are closely associated with Douglas-fir and true fir forests (WDFW 2004). Dusky grouse breed in open foothills and are closely associated with streams, springs, and meadows. Conifer thickets, their edges, and adjacent clearings are characteristic of high-quality breeding habitat. Nests are usually located near logs or under low tree branches in open timber. The dusky grouse is considered a recreationally important species that is vulnerable to habitat loss or degradation (WDFW 2021a). This species has been observed in the vicinity of the Yale Project (FERC 2006) and may use areas in and around the project area.

The project would have no direct impact on potential breeding habitat for dusky grouse, as the project would not disturb forested areas surrounding Saddle Dam Park. However, construction activities, including construction noise, may disturb dusky grouse in the project vicinity, and they may avoid the project area during construction.

Great Blue Heron

Priority areas for great blue herons are breeding areas and nearby foraging habitat (WDFW 2021a). Great blue herons are common along Yale Reservoir and in wetlands; however, there are no known breeding sites in the project vicinity (FERC 2006).

The project would have no direct or indirect impact on foraging habitat in the Frasier Creek wetlands, as the wetlands, streams, ponds, and their buffers on the west side of the park that could be used for foraging are outside the construction disturbance limits of the project. Drawdown of the reservoir would temporarily alter foraging habitat for this species along the shallow margins of Yale Reservoir. However, the proposed modifications to the dam would not substantially alter the existing shoreline condition. Construction activities, including construction noise, may disturb great blue herons foraging along the shoreline of Yale Reservoir, and they may avoid the project area during construction.

Vaux's Swift

Priority areas for Vaux's swifts are breeding areas and communal roosts (WDFW 2021a). Vaux's swifts have been observed on lands near the Yale Project (FERC 2006); however, no communal roosts are known to occur in the project vicinity. Vaux's swifts are associated with old-growth forests and mature forests in the Cascade Range, and they require hollows in large snags or live trees with broken tops for nesting and night roosting, commonly using holes excavated by pileated woodpeckers (WDFW 2004). They are common summer residents in wooded areas in Washington. Wetland, riparian, and upland forest habitats surrounding the project area may provide nesting and roosting habitat for Vaux's swifts. Potential nesting trees are not known to occur within the construction disturbance limits of the project or tree removal areas.

Project construction is not anticipated to impact breeding areas or communal roosts for this species because these habitats do not occur near construction areas.

Mammals

Columbia Black-Tailed Deer and Roosevelt Elk

Priority areas for Columbia black-tailed deer are regular concentrations and migration corridors for the species (WDFW 2021a). Priority areas for Roosevelt elk are calving areas, migration corridors, and regular concentrations in winter and in foraging areas along coastal waters (WDFW 2021a). Both species have been documented in the project vicinity.

Saddle Dam Farm is a former homestead that is managed as part of the Lewis River WHMP (PacifiCorp 2008) as an important foraging habitat area for elk. WHMP areas within the project area include fields and meadows and two orchards that are managed specifically as a source of forage for elk, with hedgerows breaking up line-of-sight and providing browse. The fields are typically mowed during the spring and late summer months to promote high-quality forage, reduce noxious weeds, and prevent shrub encroachment. The orchards are not typically mowed during the summer, as they are heavily used by bedding elk during the summer months when the fields are mowed (PacifiCorp 2008). Fall to early spring is a period of critical use for forage species, including deer and elk.

Elk use of the fields and meadows within Saddle Dam Park would be affected during construction of the project, which is estimated to last 18 months, as these areas would be used for construction access and staging. The orchards are outside the limits of disturbance and would not be impacted. However, both deer and elk are likely to avoid the project vicinity during construction due to noise disturbance and vehicle activities.

Some trees that may be used for elk browse and/or cover would be removed to accommodate construction access, the extended dam embankment, and central drainage swale. The fields and meadows used for construction access and staging would be restored following completion of the project.

Amphibian

Larch Mountain Salamander

The project would have no effect on the Larch Mountain salamander because there are no known occurrences of the species on Yale Saddle Dam or within Saddle Dam Park (FERC 2006).

6.2.5.2.1.2 Botanical Resources

Approximately 15 acres of upland herbaceous habitat, consisting predominantly of non-native grasses and forbs, would be temporarily altered for use as construction access and laydown areas. These impacts would be short term, as these areas would be restored following completion of the project.

The downstream portion of the dam embankment and abutments would be cleared and grubbed of vegetation, permanently displacing approximately 6.4 acres of grass and forb habitat and scattered trees. The surface of the extended dam embankment and abutments would be maintained free of vegetation following completion of the project.

Approximately 0.59 acre of existing vegetation, including upland herbaceous habitat and tree/shrub habitat, would be removed for construction of the central drainage swale. The drainage swale would be replanted with grass.

Approximately 140 to 150 trees would be removed for the project to accommodate construction access, the extended dam embankment, and the central drainage swale (Figure 4-3). Mitigation for the impacts of tree removal is discussed in Section 6.2.5.2.3.

6.2.5.2.1.3 Wetland Resources

The project and construction layout site have been designed to avoid all impacts to wetlands, streams, and ponds on the west side of the park. Access to the project area in Saddle Dam Park would be via Frasier Road, and access to the laydown areas west of the dam would be via the 1000 Road from Frasier Road (Figure 4-2). The construction access roads, laydown areas, and vehicle circulation are configured so that construction disturbance limits in this area are greater than 200 feet from the wetlands, streams, and ponds on the west side of the park. The standard buffer width for the streams and ponds on the west side of the park is 100 feet. No direct impacts to streams and ponds would occur as a result of the project. Indirect impacts would be avoided by maintaining the standard 100-foot undisturbed buffer widths. No vegetation clearing/removal or other ground disturbance would occur within stream or pond buffers.

Riprap rehabilitation on the upstream face of the dam on the right abutment would be within approximately 45 feet of the mouth of Stream 4 where it discharges into Yale Reservoir at the OHWL of the reservoir. This disturbance area encroaches approximately 5 feet into the standard 50-foot Riparian Habitat Area buffer for Stream 4. However, the stream buffer in this area is already hardened with riprap. Supplementing the existing riprap in this area would not result in further reduction of the functioning buffer or alter existing buffer function and would not result in adverse impacts to the stream.

6.2.5.2.2 Operations-Related Effects

Operation of the project would have no impact on wetlands. The downstream portion of the dam embankment and abutments would be cleared and grubbed of existing vegetation, and the surface of the modified dam embankment would consist of rock and would be maintained free of vegetation. These modifications to the dam embankment would permanently displace approximately 6.4 acres of grass and forb habitat and scattered trees. The extended dam embankment encroaches into the Saddle Dam Farm WHMP areas on the project area and would permanently displace approximately 1.2 acres of WHMP land managed for elk foraging habitat.

6.2.5.2.3 Proposed Protection Measures and Analysis

PacifiCorp proposes the measures listed below to minimize and mitigate for adverse impacts to wildlife, botanical, and wetland resources:

- Fields and meadows within Saddle Dam Park that would be used for temporary construction access and laydown areas would be restored following completion of the project, in accordance with the Lewis River WHMP (PacifiCorp 2008), which includes requirements for planting and managing the site to provide and maintain high-quality forage habitat for elk.
- Appropriate BMPs would be installed to minimize the transport of silt and sediments outside of the limits of construction and minimize potential impacts to Stream 4. The construction contractor would be required to comply with a TESC plan that would be implemented to manage construction stormwater runoff during construction. The TESC plan would comply with conditions contained in the construction stormwater general permit that would be obtained for the project.
- To mitigate for the remediation project impacts to wildlife and WHMP lands, PacifiCorp would contribute additional funds into the Lewis River Mitigation Fund, to be used for mitigation projects, including land acquisition or special projects on WHMP lands. PacifiCorp is currently coordinating with the TCC to develop the mitigation funding amount, which will be based on the actual project impacts on wildlife habitat. The mitigation funding is anticipated to include compensation for the permanent loss of WHMP lands; “triple stumpage payment” for the removal of trees on WHMP lands (considered to be the equivalent of a 3:1 replacement ratio); and compensation for the temporary loss of habitat use on WHMP lands during construction.

6.2.5.3 Effects of the No-Action Alternative

Under the no-action alternative, PacifiCorp would maintain a maximum operating elevation of 480 feet amsl for the Yale Reservoir indefinitely, until seismic concerns are addressed for the Yale Saddle Dam. The no-action alternative would have no impact on upland vegetation communities in the Yale Reservoir valley. However, the no-action alternative would result in a continued and long-term reduction in water level in the reservoir and wetted habitat area during the summer months, which over time would impact riparian vegetation communities along the perimeter of the reservoir and lake fringe wetlands, and could impact other associated wetlands that have a surface or groundwater connection with the reservoir. Additionally, sediments in the lakebed above 480 feet amsl would be exposed for a longer duration of time than occurs under the normal range of operating elevations and time frames, and new vegetation communities would likely establish in these areas. These impacts to wetted habitat area during the summer months and vegetation communities would result in impacts to birds and other wildlife species that utilize these habitats.

6.2.6 Threatened and Endangered Species and Essential Fish Habitat

This document examines six federally listed species with the potential to occur in the area: northern spotted owl, bull trout, coho salmon, Lower Columbia River Chinook salmon, steelhead trout, and Cascade torrent salamander. Additionally, EFH designated by the Pacific Fishery Management Council occurs in the area. No threatened or endangered vascular plant species are known to occur on or near the project area. However, a state sensitive lichen (*Usnea longissima*) occurs on a few trees at the west end of Saddle Dam Park, outside of the construction limits of the proposed action (AECOM 2022c). The proposed action would have no impact on this lichen species.

6.2.6.1 Affected Environment

6.2.6.1.1 Northern Spotted Owl

The northern spotted owl is federally listed throughout its range as threatened under the ESA. Northern spotted owl habitat is mapped throughout the township in which Yale Saddle Dam is located (WDFW 2022a), which includes forest surrounding Saddle Dam Park. Preferred habitat includes mid and late seral coniferous forests. Typical habitat characteristics for the species include generally high canopy closure, complex canopy structure involving trees of multiple age or size classes, large decaying trees and/or snags, and a high volume of downed wood.

Due to historical land use in Saddle Dam Park, including agriculture, forestry, and dam construction, the project area does not contain northern spotted owl suitable habitat (personal communication, K. Emmerson, PacifiCorp, March 17, 2022). No northern spotted owl nests are documented within 2 miles of the project area (PacifiCorp 2021a). Saddle Dam Park is not associated with a spotted owl management circle or within the 2-mile spotted owl special emphasis area buffer (PacifiCorp 2008).

6.2.6.1.2 Bull Trout

Bull trout have a documented presence in Yale Reservoir, and the reservoir was designated as critical habitat for bull trout in 2010 (75 Federal Register 9251).

6.2.6.1.3 Coho Salmon

Columbia River coho salmon are blocked by Merwin Dam and Yale Dam on the Lewis River. However, Yale Reservoir was designated as critical habitat for coho salmon in 2016 (81 Federal Register 9251).

6.2.6.1.4 Chinook Salmon

Yale Reservoir is mapped as having historical populations of naturally spawning Lower Columbia River Chinook salmon. This habitat is currently considered blocked by the major dams on the Lewis River (FERC 2006). However, Chinook salmon have been observed in Yale Reservoir having passed down from Swift Reservoir, which is now available habitat for this species.

6.2.6.1.5 Steelhead Trout

Yale Reservoir is mapped as having historical populations of naturally spawning steelhead trout. This habitat is currently considered blocked by the major dams on the Lewis River (FERC 2006). However, steelhead trout have been observed in Yale Reservoir having passed down from Swift Reservoir, which is now available habitat for this species.

6.2.6.1.6 Cascade Torrent Salamander

Cascade torrent salamanders have been documented in tributary streams/seeps to Yale Reservoir (FERC 2006) and could potentially occur in Frasier Creek, Stream 2, Stream 3, and Stream 4.

6.2.6.1.7 Essential Fish Habitat

The Pacific Fishery Management Council designated EFH for Chinook and coho salmon in 1999 (PFMC 1999). The geographic extent of freshwater EFH is identified as all waterbodies currently or historically occupied by Council-managed salmon in Washington, Oregon, Idaho, and California (PFMC 2022). NMFS previously determined that the project area includes areas designated as EFH for various life-history stages of Chinook salmon and coho salmon (NMFS 2007), and EFH for these species is mapped in the area by NMFS resources (NMFS 2022).

6.2.6.2 Environmental Effects

6.2.6.2.1 Construction-Related Effects

6.2.6.2.1.1 Northern Spotted Owl

The Lewis River WHMP (PacifiCorp 2008) contains the following conservation measures specified in the USFWS Biological Opinion for the Lewis River Hydroelectric Projects (USFWS 2006) that are potentially relevant to construction near northern spotted owl habitat:

- If construction occurs within 0.25 mile (0.4 kilometer) of unsurveyed suitable habitat, either:
    - The habitat would be surveyed to protocol prior to construction to confirm the presence or absence of northern spotted owl nesting, or
    - High-impact sound-generating activities associated with construction (such as pile driving, rock drills, or impact hammers) would be scheduled to occur outside the early nesting season of March 1 to June 30 to avoid potentially disturbing nesting northern spotted owls.

Construction would occur within 0.25 mile of northern spotted owl suitable habitat, which surrounds the project area. However, project construction is not anticipated to require the use of high-impact, sound-generating equipment. No pile driving or use of impact hammers or rock drills is anticipated to be necessary to construct the project. PacifiCorp would require the construction contractor to confirm that no high-impact sound-generating equipment would be used during construction. If the use of such equipment is proposed, PacifiCorp would implement the conservation measures listed above to avoid potential impacts to nesting northern spotted owl.

6.2.6.2.1.2 Bull Trout, Coho Salmon, Chinook Salmon, Steelhead Trout, and EFH

The reservoir would be drawn down to an elevation of 465 feet to facilitate the placement of riprap on the upstream face of the dam along the shoreline. PacifiCorp anticipates conducting the drawdown during a 2-week period in December and/or January. A drawdown may be conducted in 2 consecutive years if needed by the construction contractor to complete the project. The proposed reservoir drawdown is not expected to result in a loss of unique habitat for fish or result in fish stranding. There would be a temporary loss of linear feet of habitat from the minimized circumference of the reservoir. However, conducting the drawdown during the winter months would minimize impacts to fish due to the loss of littoral habitat, as most fish species that over-winter in the reservoir move into the deeper pelagic zones during this time.

Construction activities on the shoreline and below the OHWL in the reservoir may result in elevated sediment levels in the reservoir and could result in short-term impacts to listed fish species, managed fish species, and EFH.

PacifiCorp is consulting with the USFWS and NMFS under Section 7 of the ESA regarding the effects of the project on critical habitats and would implement additional BMPs and conservation measures identified by the Services to minimize impacts to listed fish species and designated critical habitat in Yale Reservoir. Additionally, Section 4.5.2(b) of PacifiCorp's Section 401 Water Quality Certification/Order No. 3677 issued by Ecology for the Yale Project (FERC No. 2071) requires preparation of an IWWPP to protect water resources during in-water work activities (Ecology 2006). The construction contractor would be required to comply with the approved IWWPP.

6.2.6.2.1.3 Cascade Torrent Salamander

The project avoids direct and indirect impacts to streams in the project area that provide potential habitat for Cascade torrent salamander. Therefore, construction of the proposed action would have no effect on this species.

6.2.6.2.2 Operations-Related Effects

As discussed in Section 6.2.4.2.2, reverting to a normal operating elevation of 490 feet amsl would increase the linear feet of shoreline and available fish habitat during the summer months, compared to current operations. However, water levels during the spring and winter would remain the same and would not affect available fish habitat. Operation of the proposed project would have no adverse effects on federally listed species or their critical habitat, and would return to previous conditions of the designated EFH because the project would return the reservoir elevation to historical levels.

6.2.6.2.3 Proposed Protection Measures and Analysis

PacifiCorp proposes the following measures to minimize potential impacts to northern spotted owl:

- PacifiCorp would require the construction contractor to confirm that no high-impact sound-generating equipment would be used during construction. If the use of such equipment is proposed, PacifiCorp would utilize the conservation measures described above to avoid potential impacts to nesting northern spotted owl.

PacifiCorp proposes the following measures to minimize impacts to bull trout, coho, Chinook salmon, steelhead trout, and designated critical habitat and EFH in Yale Reservoir:

- To minimize potential impacts to fish and fish habitat during drawdown of the reservoir for riprap placement, the reservoir drawdown would be conducted during a 2-week period in the winter (December and/or January) when most fish that overwinter in the reservoir move to deeper zones.
- To mitigate for potential fish stranding during drawdown of the reservoir, PacifiCorp would deploy crews at strategic locations around the reservoir once the drawdown elevation is reached, to conduct fish salvage as needed.
- To minimize the potential for elevated sediment levels in the reservoir from construction activity along the shoreline and below the OHWL, suitable BMPs would be installed to minimize the transport of silt and sediments outside of the limits of construction.
- The construction contractor would be required to comply with a TESC plan that would be implemented to manage construction stormwater runoff. The TESC plan would comply with conditions contained in the construction stormwater general permit that would be obtained for the project.
- PacifiCorp is consulting with the USFWS and NMFS regarding ESA compliance for the project and would implement additional BMPs and conservation measures identified to further minimize impacts to bull trout, coho, Chinook salmon, steelhead trout, and designated critical habitat in Yale Reservoir.
- PacifiCorp would prepare an IWWPP to protect water resources during in-water work activities to comply with the existing Section 401 Water Quality Certification for the Yale Project. The construction contractor would be required to comply with the approved IWWPP.

6.2.6.3 Effects of the No-Action Alternative

Under the no-action alternative, PacifiCorp would maintain a maximum operating elevation of 480 feet amsl for Yale Reservoir indefinitely, or until seismic concerns are addressed for the Yale Saddle Dam. The no-action alternative would have no impact on spotted owl or Cascade torrent salamanders. Impacts of the no action alternative on bull trout, Chinook salmon, and steelhead trout would be similar to impacts on fish described in Section 6.2.4, *Fisheries and Aquatic Resources*.

6.2.7 Cultural and Historic Resources

6.2.7.1 Affected Environment

Construction of Yale Saddle Dam began post-World War II as energy demands increased in response to national defense and economic growth in agriculture and industry in the Pacific Northwest. In 1951, Pacific Power and Light was granted a full license by the Federal Power Commission for construction and by 1953, the dam was complete. During construction, the complex included temporary offices, mess halls, and barracks to facilitate the maximum 1,700-person work force that operated 24 hours per day. By 1956, much of this temporary construction had been dismantled or inundated by the reservoir. By that time, the property was owned by Pacific Power and Light; the property is currently owned by PacifiCorp (Derr, Bialas, and Henderson 2021).

In June 2008, FERC granted PacifiCorp new licenses to operate the three facilities (the Lewis River Hydroelectric Projects): the Swift No. 1 Project (FERC No. 2111), the Yale Project (FERC No. 2071), and the Merwin Hydroelectric Project (FERC No. 935). Review of that relicensing process under Section 106 of the NHPA resulted in a Programmatic Agreement (PA) that stipulated implementation of a Historic Properties Management Plan (HPMP) upon issuance of the new FERC licenses. Satisfactory implementation of the PA's cultural resources stipulations by PacifiCorp as represented in the resulting HPMP constitutes FERC's compliance with Section 106 requirements. The HPMP also provides for compliance with other applicable federal and state regulations during operation and maintenance of the Lewis River Hydroelectric Projects.

No properties that were previously determined eligible for inclusion, or are currently listed, in the National Register or Washington Heritage Register are located in the project area or within a 0.25-mile radius of the project. The Yale Dam, 0.25 mile southeast of the project area, was documented in 1997 and is currently unevaluated the National Register (Brewster 1997). No previously recorded historic landmarks, cemeteries, or traditional cultural properties are in the project area or adjacent properties.

Three archaeological sites and one archaeological isolate are within the project area (Bialas and Ragsdale 2016; Derr, Bialas, and Henderson 2021). Two sites are historic, one site contains both precontact and historic components, and the isolate is precontact. One site is not eligible for the National Register, two sites are unevaluated and treated as eligible for the National Register, and the isolate is considered not eligible for the National Register.

6.2.7.2 Environmental Effects

6.2.7.2.1 Construction-Related Effects

No properties eligible or listed on the National Register or Washington Heritage Register were identified in the project area. However, two as-yet unevaluated archaeological sites have been identified in the project area. Construction activities associated with the proposed action could potentially impact these unevaluated sites and unearth previously unidentified cultural resources. However, with implementation of proposed protection measures (Section 6.2.7.2.3), including an Inadvertent Discovery Plan, it is unlikely that adverse effects to cultural resources would occur.

6.2.7.2.2 Operations-Related Effects

Operating the project after completion of the proposed seismic upgrades would not affect any known historic properties or cultural resources.

6.2.7.2.3 Proposed Protection Measures and Analysis

PacifiCorp has modified the project area of impact to avoid two of the archaeological sites and established a 25-foot no-work buffer around the features at the third archaeological site. These sites would not be impacted by the project. An Inadvertent Discovery Plan has been prepared that addresses procedures to be followed in the event a discovery is made during project construction (PacifiCorp 2017). Should archaeological materials (e.g., bones, shell, stone tools, beads, ceramics, old bottles, hearths, etc.) or human remains be observed during project activities, all work in the immediate vicinity should stop. The DAHP, Cowlitz County Historic Preservation Commission, affected Tribe(s), and Cowlitz County medical examiner (human remains only) would be contacted immediately in order to help assess the situation and determine how to preserve the resource(s). Compliance with all applicable laws pertaining to archaeological resources (Revised Code of Washington [RCW] 27.53, RCW 27.44, and WAC 25-48) is required.

6.2.7.3 Effects of the No-Action Alternative

Under the no-action alternative, PacifiCorp would maintain a maximum operating elevation of 480 feet amsl for Yale Reservoir indefinitely, or until seismic concerns are addressed for the Yale Saddle Dam. The no-action alternative could affect cultural resource sites that occur between 480 and 490 amsl. These sites would be exposed to weathering from rain, wind, and freeze/thaw events. These sites would also be exposed to increased pedestrian access and potential impacts from physical disturbance and/or looting.

6.2.8 Recreation

6.2.8.1 Affected Environment

6.2.8.1.1 Regional Recreation Facilities

PacifiCorp provides several areas for public recreation along three reservoirs: Swift Reservoir, Yale Reservoir, and Lake Merwin (PacifiCorp 2022). These sites offer a suite of outdoor recreation opportunities including camping, picnicking, wildlife viewing, hiking, swimming, fishing, and others. In addition, several of the sites include boat ramps to launch motorized watercraft. Table 6-3 summarizes the recreation opportunities provided at these sites.

Table 6-3 Summary of PacifiCorp Recreation Facilities and Opportunities

Recreation Area	Facilities and Opportunities
SWIFT RESERVOIR	
Swift Forest Camp	93 campsites, day-use picnic area, boat ramp, swimming beach, play structure, amphitheater, access to 11 Swift Reservoir dispersed shoreline campsites
Eagle Cliff Park	10 picnic tables

Recreation Area	Facilities and Opportunities
YALE RESERVOIR	
Beaver Bay Campground	63 campsites, one 15-site group camp, day-use picnic area, swimming beach, hiking trail access, boat ramp
Cougar Campground	45 campsites, one 15-site group camp, day-use picnic area, swimming beach, hiking trail access, boat ramp
Yale Park	42 picnic tables, covered picnic shelters, boat ramp, swimming beach
Saddle Dam Park	Picnic area, covered picnic shelter, swimming beach, boat ramp, equestrian and hiker trails, access to 9 Yale Reservoir dispersed shoreline campsites
LAKE MERWIN	
Cresap Bay Park	56 campsites, swimming beach, boat ramp, 23-slip marina, day-use picnic area, hiking trail, amphitheater
Speelyai Bay Park	25 picnic tables, covered picnic shelter, swimming beach, boat ramp
Merwin Park	135 picnic tables, two covered picnic shelters, swimming beach, playground structure, bank fishing, hiking trail

Source: PacifiCorp 2022

Table 6-4 summarizes peak month (July and August) and summer season (Memorial Day through Labor Day) day-use visitation data collected during a 12-year recreation use monitoring study concluded in 2021 based on field observations and concessionaire data (PacifiCorp 2021b). Approximately 112,693 people visited a PacifiCorp day-use area in the 2021 summer season, with Yale Park, Speelyai Bay, and Merwin Park having the highest levels of use.

Table 6-4 Peak Month and Summer Season Use at Day-Use Sites[1]

Recreation Area	Peak Month (July and August)	Summer Season (Memorial Day through Labor Day)
SWIFT RESERVOIR		
Swift Forest Camp	2,433	3,743
Eagle Cliff Park	849	1,393
YALE RESERVOIR		
Beaver Bay Park	1,281	1,971
Cougar Park	3,394	5,222
Yale Park	17,224	26,499
Saddle Dam Park	7,662	11,787

Recreation Area	Peak Month (July and August)	Summer Season (Memorial Day through Labor Day)
LAKE MERWIN		
Cresap Bay Park	8,231	12,663
Speelyai Bay Park	14,082	21,665
Merwin Park	18,038	27,750
Overall Total	73,194	112,693

[1] Day-use sites can include overnight camping.

Source: PacifiCorp 2021b

6.2.8.1.2 Saddle Dam Park

The proposed project is located in Saddle Dam Park on Yale Reservoir. Saddle Dam Park is open annually from Memorial Day weekend through Labor Day and supports a variety of recreation activities, including swimming, boating, shoreline picnicking, horseback riding, and hiking. The park contains day-use facilities, including a boat launch, a swim beach, an ADA-accessible picnic area with a pavilion, mooring anchorage for boat-in access, and non-motorized trails with trailhead parking for hiking and equestrian use.

The facility is popular with jet ski and personal watercraft users and power boaters, as well as equestrians that ride to the Speelyai Canal area. The Saddle Dam Park trail is located in forested areas north and west of the project area and in Saddle Dam Farm adjacent to the dam.

A parking lot for the park is located approximately 150 feet from the dam and extends for about a third of the dam's length. This parking lot is the only location that allows overnight parking for dispersed shoreline camping along Yale Reservoir.

As shown in Table 6-4, approximately 11,787 people visited Saddle Park Dam over the summer season (Memorial Day through Labor Day) in 2021 (PacifiCorp 2021b).

6.2.8.2 Environmental Effects

6.2.8.2.1 Construction-Related Effects

Saddle Dam Park would be closed and unavailable to recreational uses for the duration of the construction period, which is currently estimated at 18 months. The closure would begin between summer 2023 and winter 2023/2024, depending on timing of FERC and other regulatory approvals. Park closure is estimated to extend through the entire 2024 recreation season, possibly extending into the early part of the 2025 season. The park entrance, access road, parking lot, fields, and boat launch would be used for construction access to the park, parking, staging, and access to the dam face and would be unavailable to the public.

Some modifications to the Saddle Dam Park recreation facilities would be necessary as a result of extending the dam embankment downstream. The modifications are likely to include restoring the downstream parking lot, relocating the existing septic system at the parking lot cleanout station,

relocating the three park host sites, and relocating electric and water utilities, and fencing. Although the parking lot would be impacted by the proposed action, there would be no net reduction in parking.

On the downstream side of the dam, the gravel parking lot would be reconfigured to accommodate the expanded width of the filter and drain berm. The reconfigured parking lot would be approximately the same size as the existing lot and would include new grass vegetated islands and a new drainage swale. The park host sites at the south end of the parking lot would be relocated beyond the expanded dam embankment, and one light pole in the parking lot would be relocated.

The existing asphalt ADA-accessible ramp and fence and the concrete stairs and rails extending from the parking lot on the downstream side of the dam would be demolished and replaced in-kind on the extended dam embankment. Recreational facilities on the upstream side of the dam would remain in their existing locations. The equestrian trail where it crosses the right abutment of the dam would be restored following project completion.

Temporary adverse effects would occur by potentially displacing about 11,800 visitors annually over the construction period through closing of Saddle Dam Park (PacifiCorp 2021b). The displaced visitors could drive to visit one or more of the locations identified in Table 6-3 that offer similar recreational opportunities and facilities. The closest alternative recreation site, Cresap Bay Park on Lake Merwin, is approximately 2.3 miles away.

To mitigate the loss of Saddle Dam Park parking and boat accessibility, PacifiCorp reviewed its other Lewis River recreation facilities to locate a suitable supplemental parking and boat ramp access opportunities. PacifiCorp has identified two parks, Cresap Bay Park and Yale Park, that can be expanded to mitigate the short-term loss of parking and reservoir access at Saddle Dam Park (PacifiCorp 2021c). These proposed improvements were submitted via non-capacity license amendment applications to FERC on November 9, 2021 (PacifiCorp 2021c). Related FERC orders are pending.

6.2.8.2.2 Operations-Related Effects

The proposed action to perform a seismic rehabilitation of Yale Saddle Dam would not result in operational changes to the dam or the larger Lewis River Hydroelectric Project, with the exception of allowing the reservoir to return to a normal maximum operating level of 490 feet amsl. Saddle Dam Park would be re-opened once construction is complete. As discussed in Section 4.1.2.3, any recreational facilities affected during construction would be replaced in-kind, and the equestrian trail would be rehabilitated. No adverse effects would occur from operation of the proposed action.

Beneficial effects would occur to recreational resources by allowing the re-opening of several swim areas that are currently unusable because of the dam's lower water elevation.

6.2.8.2.3 Proposed Protection Measures and Analysis

As discussed in Section 6.2.8.2.1, PacifiCorp proposes to expand parking and reservoir access at Cresap Bay Park and Yale Park to mitigate the short-term loss of recreation access at Saddle Dam Park (PacifiCorp 2021c). No additional protection measures are proposed.

6.2.8.3 Effects of the No-Action Alternative

Under the no-action alternative, there would be no construction activities that result in short-term closure of Saddle Dam Park. PacifiCorp would maintain a maximum operating elevation of 480 feet amsl for Yale Reservoir indefinitely, or until seismic concerns are addressed for the Yale Saddle Dam.

Beneficial effects to recreation, including re-opening of several swim areas that are currently unusable because of the dam's lower water elevation, would not occur under the no-action alternative. Displaced visitors could instead visit one or more of the locations identified in Table 6-3 that offer similar recreational opportunities and facilities. The closest alternative recreation site, Cresap Bay Park on Lake Merwin, is approximately 2.3 miles away.

6.2.9 Environmental Justice

6.2.9.1 Affected Environment

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (59 Federal Register 7629), requires federal agencies to identify and address disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority communities and low-income populations. Under Executive Order 12898, demographic information is used to determine whether minority populations or low-income populations are present in the areas potentially affected by the project. If so, a determination must be made as to whether implementation of the project may cause disproportionately high and adverse human health or environmental effects on those populations.

The following analysis of environmental justice includes a discussion of the minority and economic status of affected groups and determines if the proposed action would result in disproportionate environmental effects to minority and low-income populations. Preparation of this environmental justice analysis is in accordance with the Council on Environmental Quality's (CEQ's) *Guidance for Agencies on Key Terms in Executive 14 Order 12898* (CEQ 1997) and *Promising Practices for EJ Methodologies in NEPA Reviews* (Federal Interagency Working Group on Environmental Justice 2016).

6.2.9.1.1 Meaningful Engagement and Public Involvement

CEQ (1997) and Federal Interagency Working Group (2016) guidance recommend that federal agencies provide opportunities for effective community participation, including identifying potential effects and mitigation measures in consultation with affected communities and improving the accessibility of public meetings, crucial documents, and notices.

As discussed in Section 5.1, there would be opportunities for public involvement during FERC's environmental review process and through review required by Settlement Parties under the Lewis River Settlement Agreement.

6.2.9.1.2 Definition of Minority and Low-Income Environmental Justice Populations

6.2.9.1.2.1 Minority Environmental Justice Populations

The federal definition of a minority environmental justice community requires that the minority population (or total of all minority groups) of that community either: (1) exceeds 50 percent of the total population of the community; or (2) is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis (CEQ 1997; Federal Interagency Working Group on Environmental Justice 2016). A minority population also exists if there is more than one minority group present and the minority percentage, as calculated by aggregating all minority persons, meets one of the above stated thresholds (CEQ 1997).[1]

Minority status is composed of both race and ethnicity. Minority ethnicity includes Hispanic origin (CEQ 1997). Race and ethnicity are not mutually exclusive; therefore, individuals who identify as Hispanic origin can be of any race. As a result, the white only (non-Hispanic) population represents the only non-minority population.

6.2.9.1.2.2 Low-Income Environmental Justice Populations

Executive Order 12898 itself does not define the term "low-income" as it relates to environmental justice communities. The U.S. Environmental Protection Agency guidance criteria suggests identification and analysis of low-income populations can be accomplished by (1) selecting and disclosing the appropriate poverty thresholds as defined by the U.S. Census Bureau, the poverty guidelines as defined by the Department of Health and Human Services, or other appropriate sources; and (2) identifying an appropriate geographic unit of analysis for identifying low-income populations in the affected environment (Federal Interagency Working Group on Environmental Justice 2016).[2] As a frame of reference, the federal poverty level in 2022 was $27,750 for a family of four (HHS 2022).

6.2.9.1.3 Methodology for Identifying Environmental Justice Communities in the Study Area

The U.S. Census Bureau's 2016-2020 American Community Survey was used to identify if environmental justice communities occur in the study area.[3] Following the recommendations set forth in *Promising Practices*, FERC uses the 50 percent and the meaningfully greater analysis methods to identify minority populations. Using this methodology, minority populations are defined in this analysis where either: (1) the aggregate minority population of the block groups in

[1] The CEQ defines minority individuals as persons from any of the following U.S. Census categories for race: Black/African American, Asian, Native Hawaiian or Other Pacific Islander, and American Indian or Alaska Native. Additionally, for the purposes of this analysis, minority individuals also include all other nonwhite categories, such as "some other race" and "two or more races." The CEQ also mandates that persons identified through the U.S. Census as ethnically Hispanic, regardless of race, should be included in minority counts (CEQ 1997).

[2] Statistical poverty thresholds established by the U.S. Census Bureau state a low-income population is present if the population either: (1) exceeds 50 percent of the total population of the community; or (2) is meaningfully greater than the general population (CEQ 1997; Federal Interagency Working Group on Environmental Justice 2016).

[3] Estimates from the American Community Survey are all "period" estimates that represent data collected over a period of time (as opposed to "point-in-time" estimates, such as the decennial census, that approximate the characteristics of an area on a specific date). The primary advantage of using multiyear estimates in this analysis of minority and low-income populations is the increased statistical reliability of the data for less populated areas and small population subgroups.

the affected area exceeds 50 percent; or (2) the aggregate minority population in the block group affected is 10 percent higher than the aggregate minority population percentage in the county. The guidance also directs low-income populations to be identified based on the annual statistical poverty thresholds from the U.S. Census Bureau. Using *Promising Practices'* low-income threshold criteria method, low-income populations are identified as a block group where the percent of low-income population in the identified block group is equal to or greater than that of the county.

For purposes of this analysis, the study area is defined as census tract 15.01 block group 1.[4] Furthermore, to account for local and county-wide effects and to provide a basis for comparison of the study area, environmental justice demographic data are also provided for census tract 15.01 as a whole and Cowlitz County.

6.2.9.1.4 Environmental Justice Communities in the Study Area

Census tract 15.01 block group 1 is a geographically large area, consisting of 104 square miles, with a population of 974 residents and 521 households (U.S. Census Bureau 2020a). Most of the population is concentrated in the rural communities of Yale and Cougar.

Table 6-5 shows the race, ethnicity, and poverty percentages for the environmental justice analysis area. No minority populations in census tract 15.01 block group 1 are greater than 50 percent of the population or greater than 10 percent of the aggregate minority population in Cowlitz County. However, census tract 15.01 block group 1 meets the definition of an environmental justice low-income population, because the percentage of its residents with annual incomes below the federal poverty level (14.1 percent) exceeds the countywide average (13.3 percent).

[4] By evaluating the census tract block group, the environmental justice analysis focuses on the smallest geographic area where U.S. Census data are available and has been applied to assess the effects specific to the populations in the vicinity of the proposed action.

Table 6-5 Race, Ethnicity, and Poverty by County, Census Tract, and Census Tract Block Group

Location	Total Population[1]	White[2]	Black or African American	Alaska Native & American Indians	Asian	Some Other Race[3]	Hispanic or Latino[4]	Total Minority[5]	Below Federal Poverty Level
Cowlitz County	108,399	90.7	0.9	1.2	1.2	5.9	9.3	9.3	13.3
Census Tract 15.01	3,038	93.7	0	1.6	0.4	4.3	2.5	6.3	**27.7**
Block Group 1	974	88.6	0	4.0	0	7.4	0	11.4	**14.1**

Source: U.S. Census Bureau 2020a, 2020b

Notes:

[1]Total population = non-Hispanic/Latino population + Hispanic/Latino populations.

[2] Non-Hispanic White population only, as a basis of comparison for minority groups.

[3] All Other Minorities includes Native Hawaiian and Other Pacific Islander, some other race, and two or more races.

[4] Of any race.

[5]Total minority equals total population minus the Non-Hispanic White population.

Bold indicates an environmental justice community.

6.2.9.2 Environmental Effects

6.2.9.2.1 Construction-Related Effects

Based on CEQ guidance, a disproportionately high and adverse effect on an environmental justice community would occur if the adverse effect is predominately borne by such population or is appreciably more severe or greater in magnitude on the minority or low-income population than the adverse effect suffered by the non-minority or non-low-income population.

As discussed above, there are no minority populations in census tract 15.01 block group 1 that are greater than 50 percent of the population or greater than 10 percent of the aggregate minority population percentage in the county. However, census tract 15.01 block group 1 has a higher percentage of low-income individuals than Cowlitz County and consequently is recognized as a low-income environmental justice community of concern.

All persons, regardless of race or income, would experience impacts associated with construction of the proposed action, and construction impacts, as described throughout this document, would be short term and temporary. It should be noted that the magnitude and intensity of construction activities would be greater for individuals and residences closest to the proposed action and would diminish with distance. According to the U.S. Environmental Protection Agency's EJScreen, there are five residents and five households within a 0.5-mile radius of proposed construction activities (EPA 2022). This radius is considered the area likely to experience most construction-related impacts.

Impacts on the natural and human environment from construction of the proposed action are identified and discussed throughout this document. As discussed in Section 6.2.8, Saddle Dam Park would be closed and unavailable to recreational uses for the duration of the construction

period. Potentially adverse environmental effects on surrounding communities associated with the proposed action, including environmental justice communities, would be minimized and mitigated. Thus, there would be no high adverse or disproportionate impact on environmental justice populations from construction of the proposed action.

6.2.9.2.2 Operations-Related Effects

The proposed action to perform a seismic rehabilitation of Yale Saddle Dam would not result in operational changes to the dam or the larger Lewis River Hydroelectric Project. The long-term effects of the proposed action would be beneficial because the project would reduce the risk of catastrophic failure of the dam during a seismic event. Thus, there would be no high adverse or disproportionate impact on environmental justice populations from operation of the proposed action.

6.2.9.2.3 Proposed Protection Measures and Analysis

Because the proposed action would have no disproportionate or high adverse effects with respect to environment justice communities, no protection measures are required or needed.

6.2.9.3 Effects of the No-Action Alternative

The no-action alternative assumes that FERC would require PacifiCorp to operate Yale Reservoir at a maximum operating elevation of 480 feet amsl. Thus, there would be no adverse or disproportionate impact on environmental justice populations from the no-action alternative.

6.3 Cumulative Impacts

Cumulative effects are defined as the effects on the environment that result from the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions (40 CFR § 1508.7). Cumulative effects can result from individually minor, but collectively significant, actions taking place over a period of time, including any unknown and yet to be considered hydropower and other water and land development activities.

Table 6-6 provides a list of other identified projects that could potentially occur in the area in about the same time frame as the proposed action, and their potential environmental effects.

Table 6-6 Environmental Effects of Other Identified Projects

Project Name	Description	Potential Cumulative Impacts
Cougar Campground Improvements	Relocation of four ADA campsites to meet current standards; relocation of seven standard campsites away from erosion-sensitive shoreline; new campsite signage, ADA trail connections, ADA upgrades at two existing comfort stations, and new ADA parking. Design completed and permits pending approval. Construction start anticipated: Spring 2023.	• Loss of vegetation, effects on water quality in Yale Reservoir from construction area stormwater runoff, accidental discharges, and/or erosion. • Temporary loss of access to recreational resources during construction. • Beneficial effects on recreational resources within the Yale Project boundary.
Beaver Bay Campground Improvements	New vehicular site circulation, new water distribution system, removal and relocation of group camp sites adjacent to wetlands, new walk-in sites, reconfigured RV sites, ADA retrofits throughout, three new pavilions, three new/replaced comfort stations, ADA upgrades to one existing comfort station, four new/replaced septic systems, new day-use waterless restroom, new ADA boat loading facility, and new campsite signage. Design 90% complete. Permit not yet submitted. Construction start anticipated: Summer 2023	• Loss of vegetation, effects on water quality in Yale Reservoir from construction area stormwater runoff, accidental discharges, and/or erosion. • Beneficial effects on wetlands/buffers from relocation of campsites, internal campground roads away from wetlands. • Temporary loss of access to recreational resources during construction. • Beneficial effects on recreational resources within the Yale Project boundary.

Potential cumulative impacts of the proposed action in addition to the potential impacts of other identified projects are summarized below.

6.3.1 Geology and Soil Resources

The proposed action is not anticipated to result in cumulative impacts on geology or soil resources within the Yale Project boundary when added to the potential impacts of other identified projects in Table 6-6.

6.3.2 Water Quantity

The proposed action is not anticipated to result in cumulative impacts on water quantity within Yale Reservoir when added to the potential impacts of other identified projects in Table 6-6.

6.3.3 Water Quality

Construction of the proposed action and the other identified projects in Table 6-6 could result in the stockpiling of soils and earth-moving activities that increase soil erosion in the vicinity of Yale Reservoir. Additionally, water quality could be adversely affected by potential increases in stormwater runoff and the inadvertent release of chemicals, including fuels, oils, and solvents, that could enter drainages through surface runoff or subsurface absorption through soils. Each of these projects has the potential to temporarily affect water quality in Yale Reservoir. However, because of federal, state, and local regulatory requirements for water quality protection measures for each of the individual projects, cumulative impacts on water quality are unlikely to occur.

6.3.4 Fisheries and Other Aquatic Resources

The proposed action is not anticipated to result in cumulative impacts on fisheries and other aquatic resources within the Yale Project boundary when added to the potential impacts of other identified projects in Table 6-6.

6.3.5 Wildlife, Botanical, and Wetland Resources

The proposed action would result in the permanent removal of approximately 6.4 acres of existing grass and forb habitat managed specifically for elk forage, and approximately 140 to 150 trees in Saddle Dam Park, affecting terrestrial habitat for a variety of wildlife species that currently utilize the project area. Each of the identified projects in Table 6-6 would also result in the removal of existing vegetation in the Yale Reservoir valley. While the exact type and quantity of vegetation removal for the other identified projects is unknown at this time, the proposed action could contribute to a cumulative impact on vegetation and terrestrial wildlife habitat in the Yale Reservoir valley. However, this impact is expected to be minor, as the proposed action includes mitigation for the unavoidable impacts of vegetation removal in Saddle Dam Park that is expected to compensate for these impacts over time. Additionally, because vegetation removal at the other identified projects is not anticipated to include fields and meadows specifically managed for elk, the proposed action is not anticipated to contribute to a cumulate impact on WHMP lands managed for elk. The proposed action would not result in cumulative effects to wetlands, streams, or ponds in the Yale Reservoir valley or their associated buffers.

Construction activities for the proposed action, when considered in addition to those associated with the other identified projects, could result in cumulative impacts on terrestrial wildlife in the Yale Reservoir valley from vegetation removal, earth-moving activities, construction noise, and general construction disturbance, as wildlife may avoid these areas. However, these impacts are expected to be minor, as similar habitats are widely available nearby.

6.3.6 Threatened and Endangered Species

The proposed action is not anticipated to result in cumulative impacts on threatened and endangered species when added to the potential impacts of other identified projects in Table 6-6.

6.3.7 Cultural and Historic Resources

The proposed action is not anticipated to result in an adverse impact to cultural resources and would therefore not contribute to cumulative effects on cultural and historic resources when added to the potential effects of other identified projects in Table 6-6.

6.3.8 Recreation

The proposed action would result in temporary impacts to recreation resources and short-term impacts to recreational opportunities at Saddle Dam Park during construction. Construction of the proposed action is estimated to take up to 18 months, resulting in the loss of recreational opportunities at Saddle Dam Park for 2 to 2.5 seasons between Summer 2023 and the early part of Summer 2025. The Cougar Campground and Beaver Bay Campground Improvements would

result in similar temporary and short-term impacts. Construction of these projects is anticipated to begin at about the same time as the proposed action, although the duration of construction is unknown at this time. Therefore, the proposed action, when considered in addition to these other projects, could contribute to an adverse cumulative impact to recreational opportunities on Yale Reservoir. However, these impacts would be short term, and PacifiCorp has identified proposed mitigation to compensate for recreation impacts of the proposed action.

The proposed action would allow the reservoir to return to a normal maximum operating level of 490 feet amsl. This would allow the re-opening of several swim areas in the reservoir that are currently unusable because of the dam's lower water elevation and would have a long-term beneficial impact on recreational opportunities on Yale Reservoir. When considered in addition to the other identified projects, which include improvements to recreational resources on Yale Reservoir, the proposed action would have a long-term beneficial impact on recreation.

6.3.9 Environmental Justice

The proposed action is not anticipated to result in a high adverse or disproportionate impact on environmental justice populations and would therefore not contribute to cumulative effects on these populations when added to the potential effects of other identified projects in Table 6-6.

6.4 Consistency With Comprehensive Plans

6.4.1 Cowlitz County Comprehensive Plan

The Cowlitz County Comprehensive Plan (Cowlitz County 2017) provides a framework for decision-making for future growth and development in the county. The Comprehensive Plan provides guidance that informs development of regulations and future planning efforts. Table 6-7 lists the elements of the plan and briefly describes how the proposed action is consistent with element goals.

Table 6-7 Project Consistency with Cowlitz County Comprehensive Plan

Plan Element	Project Consistency
Natural Environment and Resources	The project complies with all county development regulations that protect critical areas, land, air, water, and other natural resources.
Land Use	The project area is zoned as Smallholding. The project complies with this zoning, as it is an upgrade of an existing development and does not increase development density.
Parks, Trails, and Recreation	Following the 18-month construction period, the project would continue to provide long-term access to recreation facilities that are equivalent to those offered at present.
Transportation and Circulation	Apart from short-term transportation impacts during construction, the project would not affect transportation and circulation in the project vicinity.
Public Services, Facilities, and Utilities	The purpose of the project is to improve the seismic performance of the dam, which would protect the public services and utilities provided by the Yale Hydroelectric Project. The seismic remediation project provides utility infrastructure improvements that support electricity generation and flood control.

6.4.2 Lewis River Hydroelectric Project Management Plans

The Lewis River WHMP (PacifiCorp 2008) was developed to offset habitat impacts and wildlife losses resulting from continued operation of the Lewis River Hydroelectric Projects. The plan identifies provisions to protect, mitigate, and enhance wildlife on PacifiCorp-owned and/or -controlled lands associated with the Lewis River Hydroelectric Projects. The project vicinity includes the Saddle Dam Farm, which has been managed to maintain a cover forage ratio beneficial to elk. This meets the requirement to manage PacifiCorp lands to benefit wildlife. Other pertinent measures include buffering sensitive aquatic and terrestrial habitat from ground-disturbing activities, implementing access control as needed to protect sensitive habitat, and managing roads to maintain aquatic connectivity and control runoff and erosion. The project would meet the requirements of the WHMP by avoiding wetlands and riparian areas, drawing down the reservoir to avoid in-water work below the OHWL, implementing BMPs to keep sediment from entering the reservoir, and restoring elk habitat disturbed during construction.

The Recreation Resource Management Plan (RRMP) for the Lewis River Hydroelectric Projects (PacifiCorp 2020b) guides recreation resource management on project lands during the FERC license period. The RRMP identifies measures for existing and proposed recreation resources and describes programs designed to implement those measures. Although the proposed action would result in closure of Saddle Dam Park for approximately 18 months and the short-term loss of recreational uses, the project would be in compliance with the plan because it would not result in a long-term reduction of recreational uses. All recreational facilities disturbed or demolished by the project would be restored or replaced in-kind (see Section 6.2.8).

The Lewis River Shoreline Management Plan (PacifiCorp 2014) provides guidance for management of shoreline areas (lands within the elevation contour 10 feet above the OHWL) for Yale Reservoir, which includes the proposed area. The proposed action is consistent with the requirements of the Lewis River Shoreline Management Plan because it does not alter shoreline uses and because the proposed construction would be conducted in compliance with Cowlitz County and state shoreline regulations (see Section 6.2.4).

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ATTACHMENT A – FIGURES

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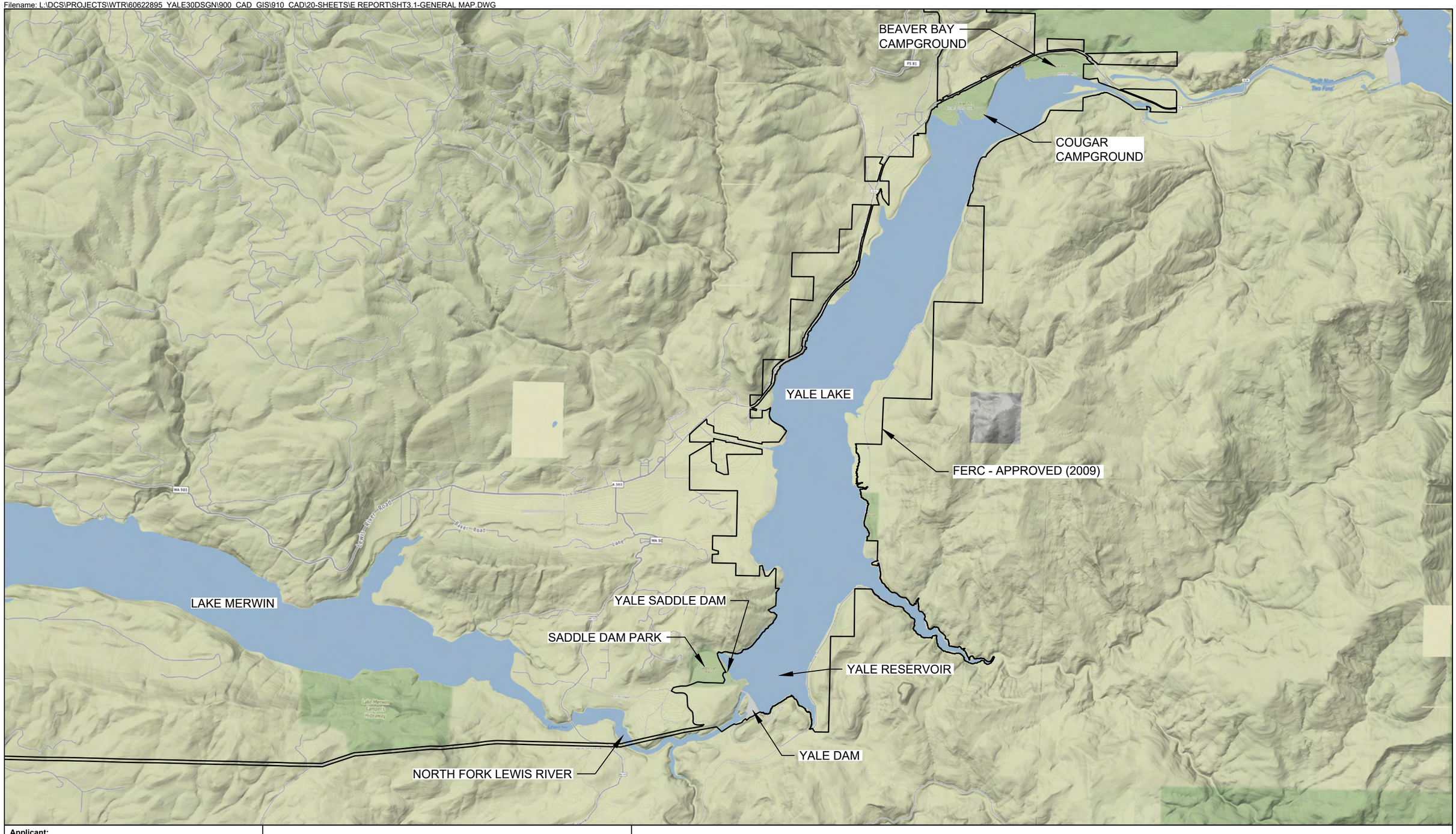

Applicant:
PACIFICORP
A BERKSHIRE HATHAWAY ENERGY COMPANY

Yale Hydroelectric Project (FERC No. P-2017)
Application for License Amendment
Exhibit E - Environment Report

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SCALE IN FEET

FIGURE 3-1
General Map of Yale Project

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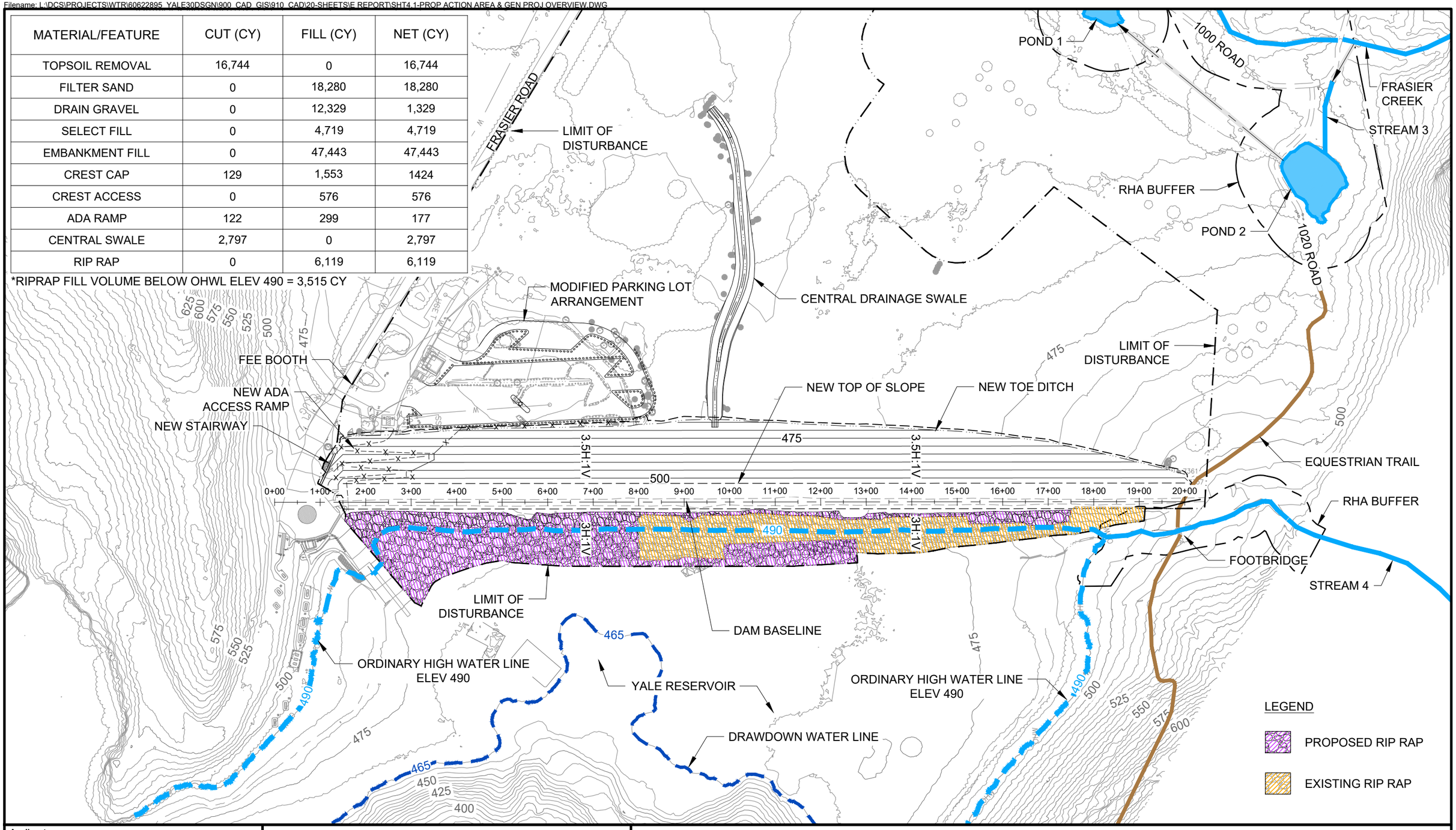
MATERIAL/FEATURE	CUT (CY)	FILL (CY)	NET (CY)
TOPSOIL REMOVAL	16,744	0	16,744
FILTER SAND	0	18,280	18,280
DRAIN GRAVEL	0	12,329	1,329
SELECT FILL	0	4,719	4,719
EMBANKMENT FILL	0	47,443	47,443
CREST CAP	129	1,553	1424
CREST ACCESS	0	576	576
ADA RAMP	122	299	177
CENTRAL SWALE	2,797	0	2,797
RIP RAP	0	6,119	6,119

*RIPRAP FILL VOLUME BELOW OHWL ELEV 490 = 3,515 CY



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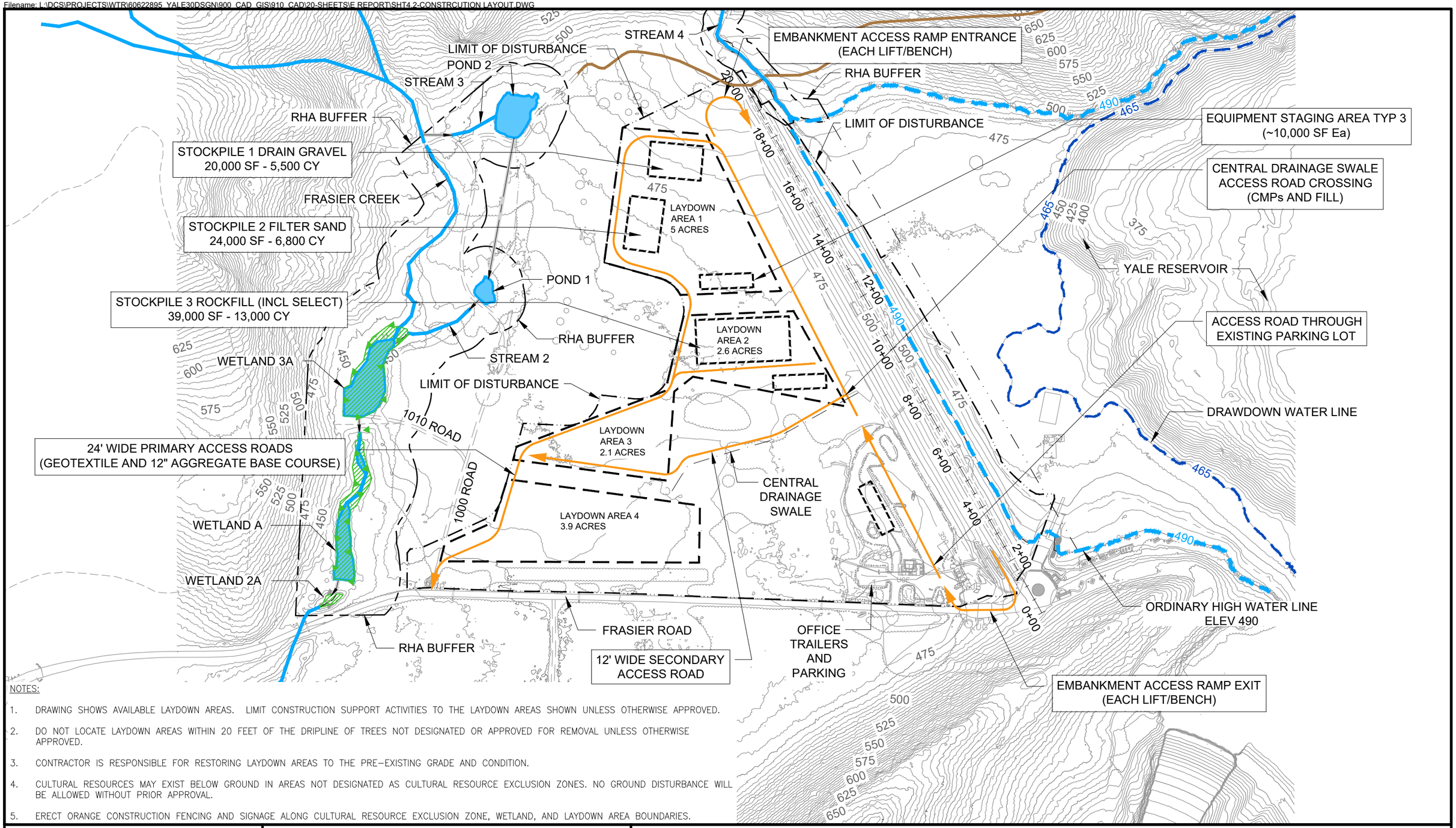
N E S W
50 0 50 100
SCALE IN FEET

FIGURE 4-1
Proposed Action Area and General Project Overview

AECOM

Filename: L:\DCS\PROJECTS\WTR\60622895_YALE30DSGN\900_CAD_GIS\910_CAD\20-SHEETS\E REPORT\SHT4 2-CONSTRCUTION LAYOUT.DWG



NOTES:

1. DRAWING SHOWS AVAILABLE LAYDOWN AREAS. LIMIT CONSTRUCTION SUPPORT ACTIVITIES TO THE LAYDOWN AREAS SHOWN UNLESS OTHERWISE APPROVED.
2. DO NOT LOCATE LAYDOWN AREAS WITHIN 20 FEET OF THE DRIPLINE OF TREES NOT DESIGNATED OR APPROVED FOR REMOVAL UNLESS OTHERWISE APPROVED.
3. CONTRACTOR IS RESPONSIBLE FOR RESTORING LAYDOWN AREAS TO THE PRE–EXISTING GRADE AND CONDITION.
4. CULTURAL RESOURCES MAY EXIST BELOW GROUND IN AREAS NOT DESIGNATED AS CULTURAL RESOURCE EXCLUSION ZONES. NO GROUND DISTURBANCE WILL BE ALLOWED WITHOUT PRIOR APPROVAL.
5. ERECT ORANGE CONSTRUCTION FENCING AND SIGNAGE ALONG CULTURAL RESOURCE EXCLUSION ZONE, WETLAND, AND LAYDOWN AREA BOUNDARIES.

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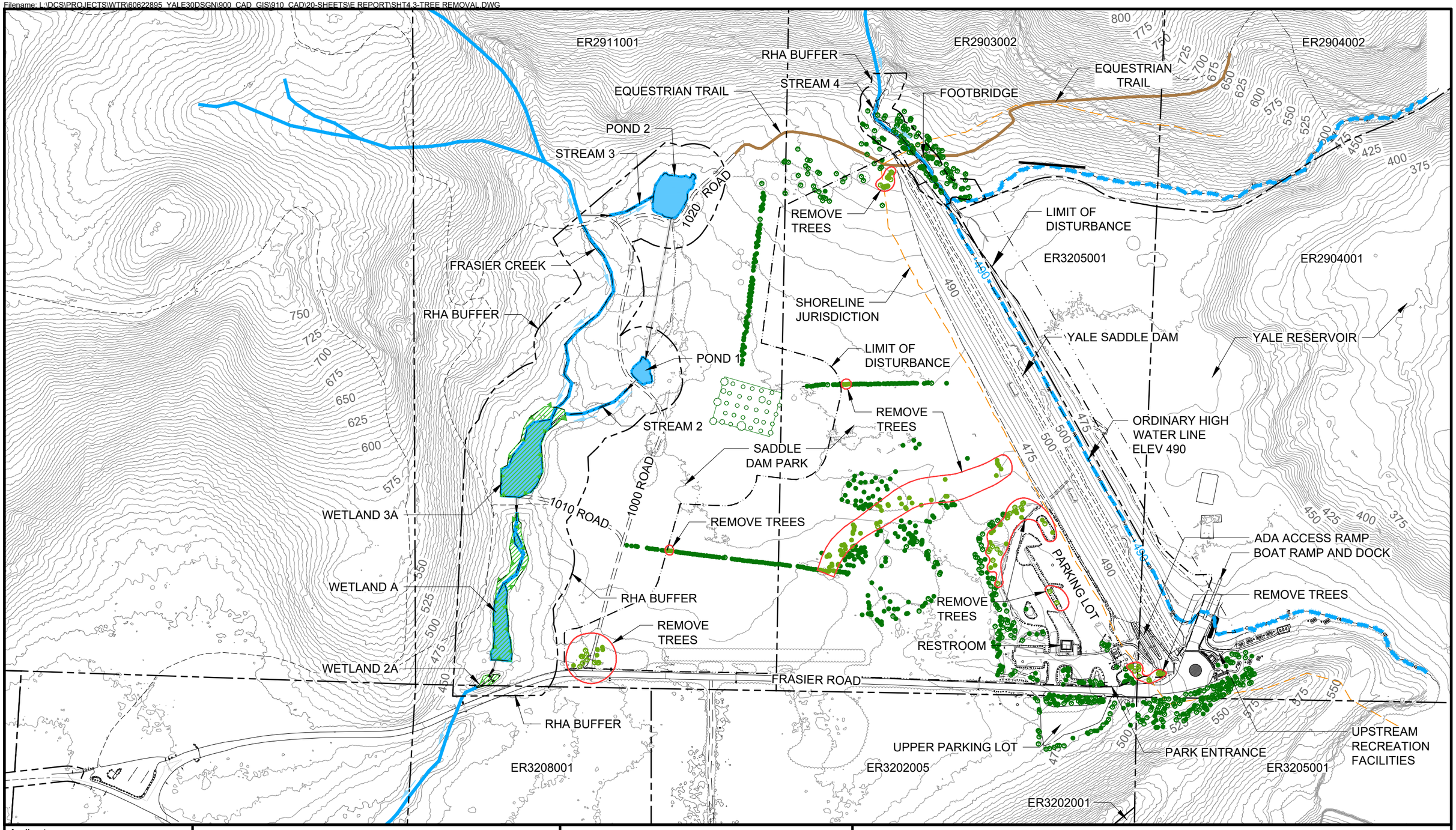
SCALE IN FEET

FIGURE 4-2
Construction Layout

AECOM

Filename: L:\DCS\PROJECTS\WTR\60622895_YALE30DSGN\900_CAD_GIS\910_CAD\20-SHEETS\E REPORT\SHT4.3-TREE REMOVAL.DWG



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Legend
- Stream
- Wetland
- Water
- Culvert
- Ordinary High Water Line
- Shoreline Jurisdiction
- Limit of Disturbance
- Trees

N W E S

50 0 125 250
SCALE IN FEET

FIGURE 4-3
Tree Removal

AECOM

Filename: L:\DCS\PROJECTS\WTR\60622895_YALE30DSGN\900_CAD_GIS\910_CAD\20-SHEETS\E REPORT\SHT4.4-DAM EXCAVATION PLAN.DWG

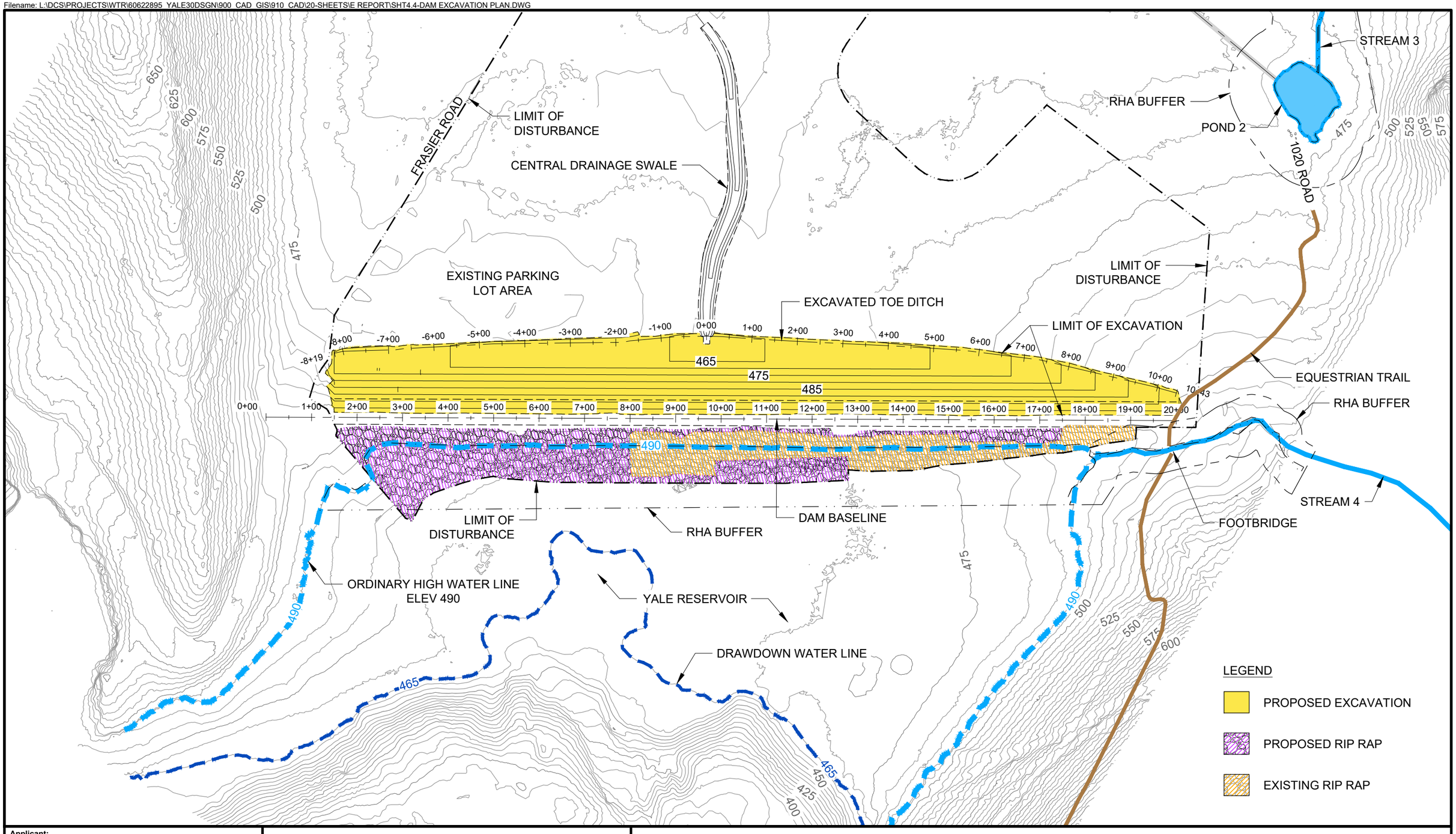

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FIGURE 4-4
Dam Excavation Plan

AECOM

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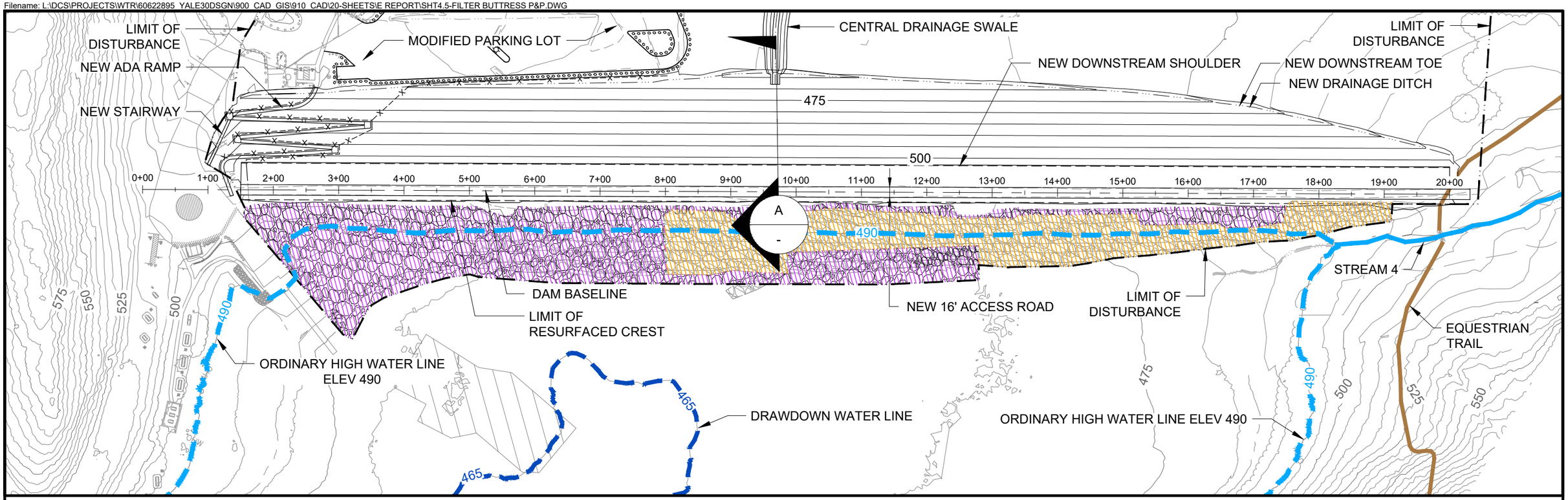

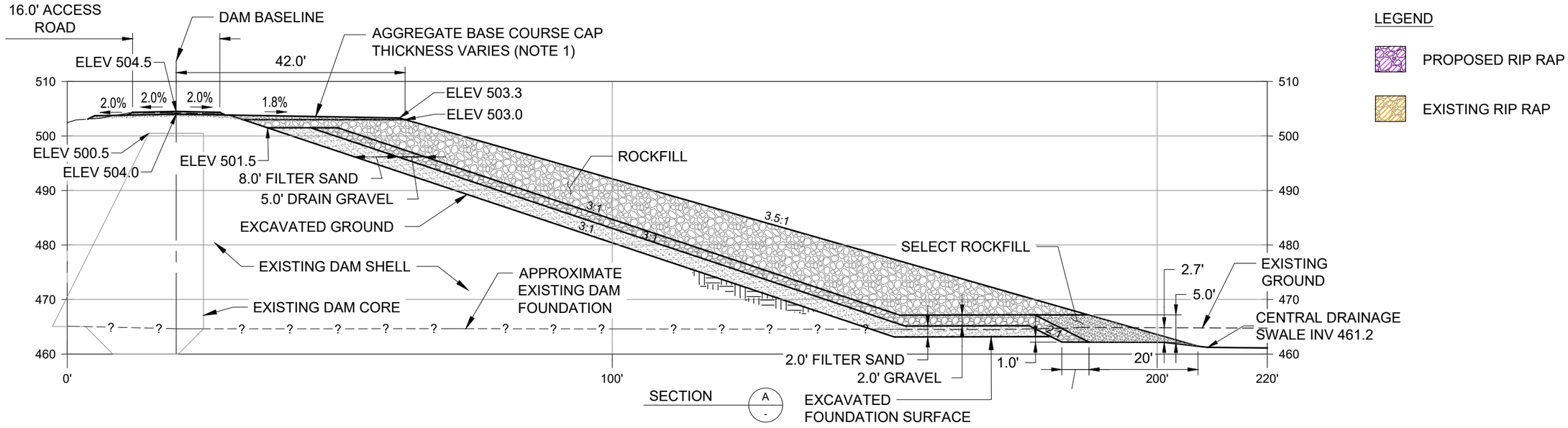

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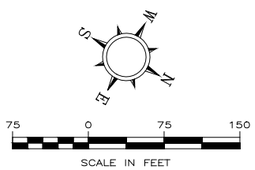

FIGURE 4-5
Filter and Drain Berm Plan and Section

AECOM

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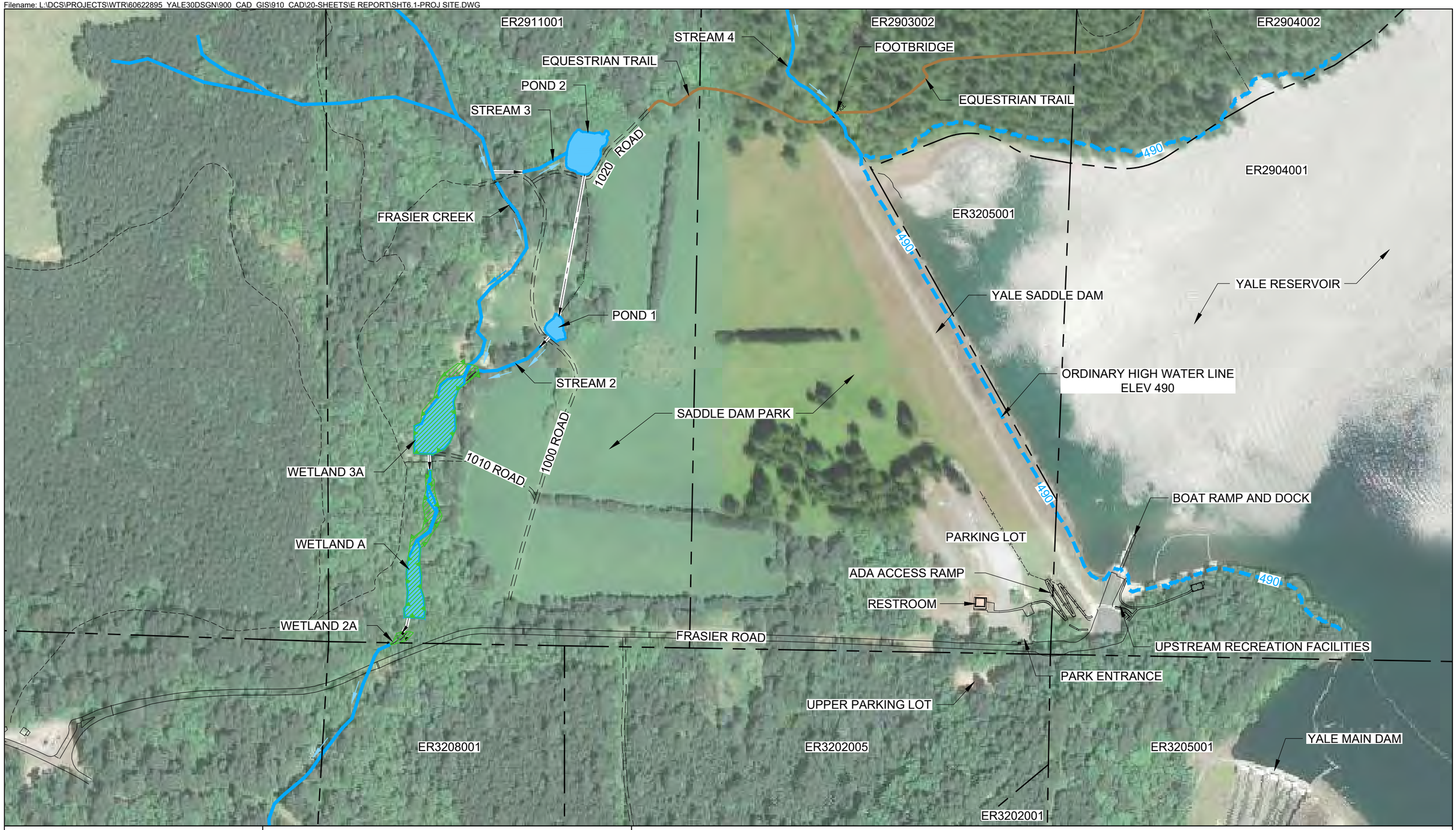

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SCALE IN FEET

FIGURE 6-1

Project Site - General Overview Map

AECOM

Filename: I:\DCS\PROJECTS\WTR\60622895_YALE30DSGN\900_CAD_GIS\910_CAD\20-SHEETS\E REPORT\SHT6.2-EXIST COND PLAN.DWG

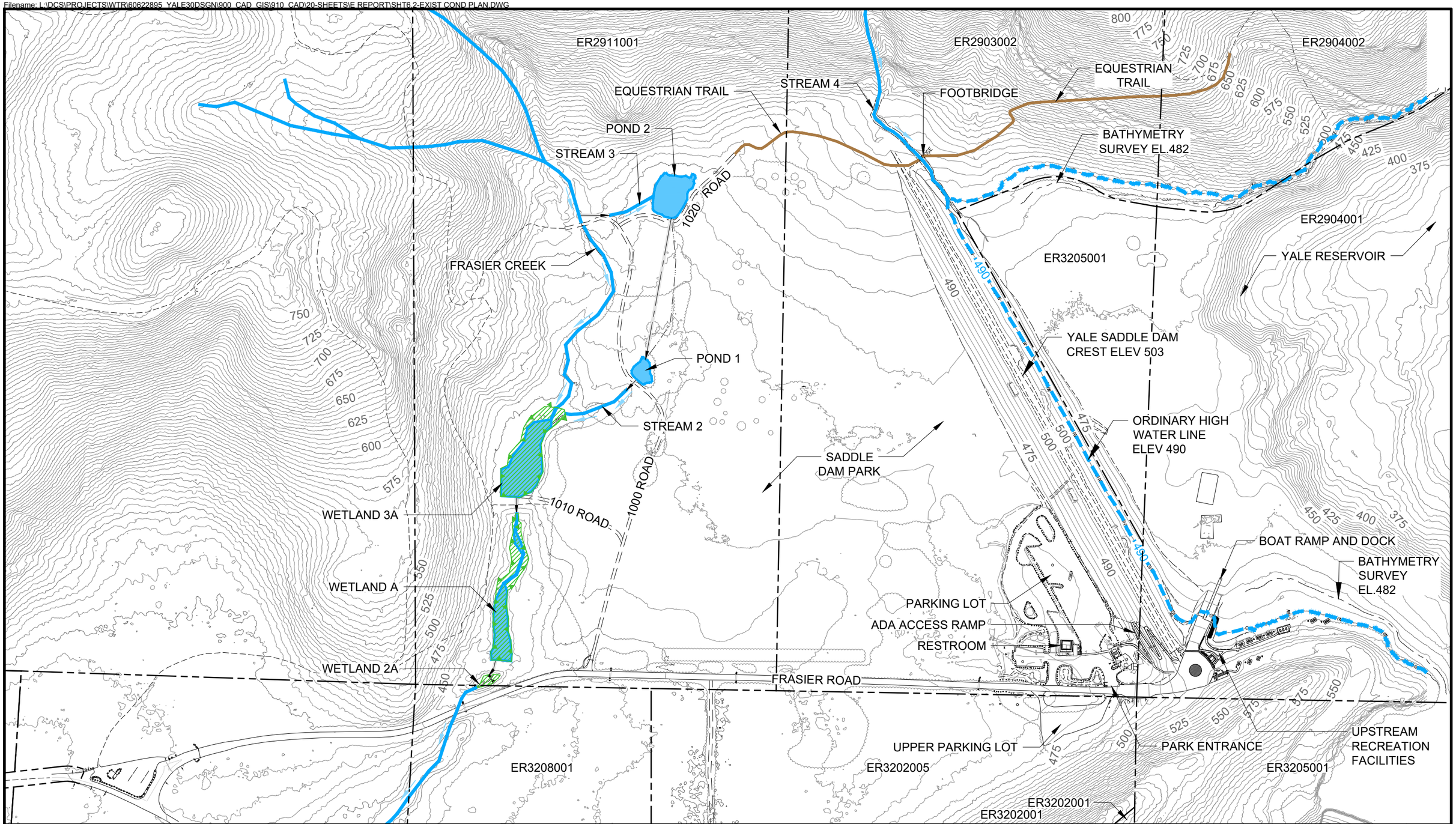

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FIGURE 6-2

Project Site - Existing Conditions Map

AECOM